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# Development of Computerized Emission Projection and Allocation System Phase I. Preliminary Feasibility Study

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This report describes a preliminary feasibility assessment to determine the need for a computerized emission projection and allocation (CEPA) system. The primary application of a CEPA system would be the computerization of otherwise long and tedious calculations required to properly assess growth and development when considering the maintenance of the national ambient air quality standards. A major portion of the assessment came from interviews with nine potential users of a CEPA system--seven air pollution control agencies and two local and regional planning organizations. The study concludes that although a CEPA system would be beneficial if properly designed, the major constraint facing its use is the fact that the schedule for completion of air quality maintenance plans would not permit many States to wait until the development of a CEPA system. The report, however, identifies uses of the system other than the current effort of air quality maintenance plan development.

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## EPA PROJECT OFFICER'S COMMENT

On pages 63 and 64 of the report, Argonne National Laboratory reported that several States had problems with some of EPA's automated data systems. Subsequent to the submission of the report to EPA, EPA discussed the alleged problems with those States. As a result of those discussions, the project officer has made several changes to Argonne's text on pages 63 and 65 to reflect those discussions.

# Feasibility Study for the Development of a Computerized Emission Projection and Allocation System

## Phase I

## Preliminary Feasibility Study

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## 1. EXECUTIVE SUMMARY

The Argonne National Laboratory, Energy and Environmental Systems Division has completed a preliminary feasibility assessment to determine the need for a computerized emission projection and allocation system (CEPA). The primary application of a CEPA system is the computerization of otherwise long and tedious calculations required to properly assess growth and development when considering the maintenance of National Ambient Air Quality Standards. The purpose of this feasibility assessment is to determine the actual use such a system would receive and to assess the positive and negative aspects of an EPA developed CEPA system.

Data for the CEPA system assessment came from a variety of independent sources including Federal documents, EPA headquarters, EPA Regional Offices, state air pollution control agencies, regional planning agencies and private sector contractors participating in AQMP. All aspects of CEPA application were investigated including legislative and policy requirements, computer capabilities, user skill and knowledge requirements, potential application and system design. A major portion of the assessment came from interviews with nine potential users of a CEPA system. Seven of the visits were conducted with specially selected state air pollution control agencies. Two visits were made with local and regional planning organizations. In addition to agency interviews, all ten Regional Offices were interviewed by telephone.

While most all those interviewed indicated a CEPA system would be beneficial if properly designed, the major constraint facing its use is the schedule for completion of maintenance plans and the earliest date when a CEPA could be made available. A CEPA developed by January 1977 could be useful in 33% of set 1 pollutant assessments and 52% of the set 2 pollutant assessments. If a CEPA system were not made available for use until mid-1977 the potential usage drops to 12% of set 1 assessments and 38% of the set 2 assessments. A total of seventeen pollutant assessments would be the potential use of a CEPA system made available by mid-1977.

While direct application of a CEPA system to initial AQMA assessments is limited by scheduling constraints, greatest benefit and application of a CEPA system may be in non-AQMP related work. Potential users of CEPA expressed a need for computerized aids incorporated in a CEPA for other agency work; New Source Review, Prevention of Significant Deterioration, data management, AQMP rechecks and revisions and long term planning are all examples of potential CEPA use by state and local air pollution control agencies.

Potential users generally agreed that a CEPA system to be useful would have to be modular in design, easily used by engineers with basic FORTRAN programming backgrounds and, above all, the CEPA system must accept a wide variety of locally formated data.

If a CEPA were made available and did not require additional agency resources it would be considered for use by all those interviewed. If a CEPA system were not developed, current state plans would not be adversely affected. If a CEPA system were in use, however, those plans would most likely exhibit a greater level of detail and accuracy.

Three courses of action are suggested. The first would be to discontinue further study at this time since the CEPA system will be of little use to the current air quality maintenance planning effort. The second would be to proceed with the previously defined Phase 2 effort in the interest of having a CEPA system available for the later AQMA analyses. The third would be to expand the scope of Phase 2 to include potential long range CEPA applications to other air quality analysis needs. Arguments for and against pursuing each course of action are given.

# 2. INTRODUCTION

## 2.1. LEGISLATION AND POLICY REQUIREMENTS

Section 110 of the Clean Air Act requires States to develop and revise whenever necessary, plans to implement the National Ambient Air Quality Standards. EPA has established NAAQS for six pollutants -- particulate matter, sulfur oxides, carbon monoxide, hydrocarbons, photochemical oxidants, and nitrogen dioxide. EPA is also developing a standard for lead, which will tentatively be proposed in August 1977.

States were required to submit their State Implementation Plans (SIPs) to EPA in January 1972. The plans had to provide for both the attainment of the national standards by May 31, 1975, and the maintenance of these standards indefinitely thereafter. States could obtain an extension of this attainment date of up to two years, but for most areas, the May 1975 date remained applicable. Attainment of the standard in many cases implies a reduction of emissions that contribute to elevated air pollutant concentrations. SIPs contain control strategies that employ emission limitations for stationary sources. The Federal motor vehicle emission control program under Title II of the Clean Air Act is reducing most of the emissions from mobile sources; in densely population areas where the Federal program is insufficient to attain the standards, however, restrictions on automobile use are being employed. Maintenance of the standards implies restriction of emission increases that accompany new sources so that the air pollutant concentrations remain below the standard.

### 2.1.1. Attainment of National Standards

Although the attainment date for the primary national ambient air quality standards for most areas was May 31, 1975, there are many areas that did not attain the standards. Although in some of these areas the reasons for non-attainment is the lack of enforcement or the granting of extensions to compliance schedules that extend beyond the attainment date, the reasons for many of the non-attainment problems are inadequate plans. Where it was determined that a plan is substantially inadequate to attain a standard, EPA in July 1976 called for a revision to the implementation plan and established a schedule for its submission. The State performing the revision has to analyze the area in question to determine the magnitude of the inadequacy and then develop a plan to overcome this inadequacy. In performing the analysis and developing the plan revision, the State will have to project and allocate emissions and determine the effect on air quality of control strategies that it wants to apply.

### 2.1.2. Maintenance of National Standards

As a result of a reassessment of plans required under the 1973 court ruling in NRDC V. EPA, 475 F. 2d 968 (D.C. Cir), EPA determined that no State plan contained sufficient measures to ensure long-term maintenance of the standards. On June 18, 1973, EPA promulgated regulations for States to identify those areas that have the potential to exceed any national standard within the subsequent ten year period. These areas are called air quality maintenance areas (AQMAs). For each AQMA, States must analyze the air quality impact of growth and development.

Under regulations promulgated by EPA on May 3, 1976, States must submit their AQMA analyses on schedules established by the appropriate Regional Administrator. Following receipt of analyses, EPA will then decide, and in many cases has decided, which AQMAs will need plan revisions based on the analyses.

EPA published the list of AQMAs in three parts.* EPA identified 168 areas for at least one pollutant. Of these 159 areas were identified for particulate matter, 61 for sulfur dioxide, 49 for photochemical oxidants, 24 for carbon monoxide, and five for nitrogen dioxide. This results in a total of 298 AQMA-pollutant combinations. Most of the AQMAs are composed of more than one county. There are more than 400 counties (or county equivalents) and parts of counties included in the AQMAs out of a total of 3,141 counties in the United States.

### 2.1.3. Regulatory Requirements

EPAs Office of Air Quality Planning and Standards (OAQPS) published the Guidelines for Air Quality Maintenance Planning and Analysis to provide guidance on techniques for long-term analysis of air quality maintenance plans.[1-13] The May 3rd, 1976, Federal Register contained EPA regulations concerning air quality maintenance that require states to use Volume 7, Projecting County Emissions, and Volume 13, Allocating Projected Emissions to Sub-County Areas, in developing SIP revisions in AQMAs and other areas identified by the Regional Administrators.[14] (EPA Regional Administrators may allow states to use alternative techniques, however.) Volume 7 defines a specific and uniform methodology to upgrade existing emission inventories and to forecast future emissions of air pollutants within counties. Volume 13 describes a methodology for projecting and allocating emissions to subcounty areas.

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*Federal Registers: April 29, 1975 (40 FR 18726); June 2, 1975 (40 ER 23746); September 9, 1975 (40 FR 41942).

Also, EPA regulations (40 CFR 51.12) require states to collect information on growth in emissions and to analyze all areas at least every five years to determine which areas may need plan revisions. Where EPA calls for plan revisions, the states will have to prepare the revisions in accordance with part or all of 40 CFR 51. If EPA requires states to perform the detailed emissions and air quality projections of Subpart D (which pertain in all cases to AQMAs), states will have to use Volumes 7 and 13 of EPAs guidelines or approved alternative methods. If a state does not submit an adequate revision when asked to do so by EPA, EPA must prepare and promulgate a plan in accordance with its own regulations.

## 2.2. STUDY BACKGROUND

Through informal discussion with agencies and individuals conducting the analyses required to conform to these regulations, it appeared that the calculation procedures, although relatively straightforward, were long and tedious and might be consuming an inordinate amount of resources to perform. The possibility of providing a computerized version of the analysis techniques was presented and EPA has decided to embark on a feasibility study to determine if there is a need for such a system and if existing computerized packages could be used to satisfy all or part of the analysis requirements.

The determination of need for a Computerized Emission Projection and Allocation (CEPA) system is to be carried out in a 3-phase feasibility study. Phase 1, the results of which are represented in this document, is designed to determine if there is a need for a CEPA system as perceived by the agencies involved in the maintenance planning process; specifically, the EPA Regional Offices, the state air pollution control agencies, and the local and regional planning agencies. Upon a positive determination of need in Phase 1, a review of several alternative existing systems would be conducted as part of Phase 2. The objective of this study would be to determine if existing systems could meet the analysis requirements with some modifications. Phase 3 would be initiated if it were determined by the Phase 2 effort that an existing system would need major revision or that an entirely new system would be needed. The goal of this phase would be to develop a system specification document that could be used as part of a procurement package.

## 2.3. FUNDAMENTAL CONCEPTS

There are some fundamental concepts that need clarification in the light of the feasibility study requirements. First, the CEPA system, as currently perceived, is not intended as a comprehensive data base on growth and development. Rather, it is intended to operate from such a comprehensive data base and transform growth and development projections into emission projections. Although data base management and manipulation will, of necessity, be an important part of the system, an agency performing an analysis using CEPA would still have to expend the necessary effort to collect the basic information.

A second important point that needs to be emphasized is that the CEPA system is not envisioned as a complete air quality analysis tool. It will not, for example, include an air pollutant dispersion model although it will be designed to interface with a variety of models. CEPA's principle focus will be on emissions and on carrying out the calculations necessary to project emissions and to allocate these to a better than countywide spatial resolution.

Third, the CEPA system is not intended to be a development of new methodologies for growth projections. It will not, for example, provide various regression techniques to determine future trends from historical patterns. CEPA is envisioned as picking up the analysis once these projections are made and transforming them into emissions.

# 3. METHODOLOGY USED

The basic procedure used in this Phase 1 of the feasibility study was to first review several pertinant documents that outlined specific requirements for a CEPA system and then to conduct a series of interviews with EPA Regional Offices, state air pollution control agencies, and regional planning agencies participating in the AQMA analysis.

## 3.1. DOCUMENTS REVIEWED

The primary documents serving as guidance on CEPA system needs were the published guidelines on AQMA analysis[1-13], and the regulations outlining specific requirements that must be followed[14], and the timing of analysis submissions[15].

Another set of documents that deal with general governmental requirements on automatic data processing (ADP) systems were also reviewed. These included EPA's automatic data processing manual[17], Office of Management and Budget Circular A-109 that outlines procedures for major systems acquisition[18], General Services Administration Federal Management Circular 74-2 that deals with the tracking of ADP in the government[19], Bureau of the Budget Circular A-76 that prescribes policies on the acquisition of commercial or industrial products for government use[20], and the Code of Federal Regulations section that deals with government-wide ADP services[21]. The objective in reviewing these documents was to insure that the current feasibility study complied with all the necessary requirements of general government and EPA policy on ADP system evaluation.

## 3.2. AGENCY INTERVIEWS

Three specific types of agencies involved in air quality analyses were interviewed to determine their perception of CEPA system need. These were EPA Regional Offices, state air pollution control agencies, and regional planning agencies.

### 3.2.1. EPA Regional Offices

All ten EPA Regional Offices were contacted regarding the CEPA system feasibility study. In each region a telephone discussion was held with the EPA Regional Office representative responsible for issues concerning maintenance of air quality standards. Each representative was asked to give his opinion on specific issues pertaining to CEPA feasibility and development. General opinions were solicited and then each representative was asked to suggest states to visit who would provide a state agency's perspective regarding CEPA feasibility. Three of the Regional Office desiring additional discussion about CEPA were visited. Regional meetings were attended by technical AQMP staff and computer systems staff. Regional opinions were again discussed within a larger group. State agency questionnaires were also reviewed and regional comments were incorporated in a revised state questionnaire.

### 3.2.2. State Air Pollution Control Agencies

Air pollution control agencies selected for the CEPA review were chosen according to the following criteria:

1) Regional office recommendations
2) Geographic distribution
3) Agency size
4) EPA staff recommendations.

Regional office recommendations were solicited from each of the ten regional air quality maintenance representatives. Specifically, regional representatives were asked to suggest agencies which could best provide a sample of the tasks and problems being encountered in AQMA plan development.

EPA staff was solicited for additional candidates who could provide insight regarding AQMP analysis. A list of fifteen potential agencies was reviewed and reduced to nine site visits. Major considerations in the final agency selection insured that 1) the survey would adequately cover the nation geographically, 2) the survey would include large well funded agencies as well as small agencies with limited funding, and 3) the survey would include agencies with diverse pollutant problems and AQMA designations.

Final agency selections were approved by EPA staff and regional air quality maintenance representatives. Constrained by OMB regulations, Argonne could perform only nine interviews. In an attempt to include several regional planning organizations, the list of state air pollution control agencies visited was reduced to seven.

## Characteristics of Selected Air Pollution Control Agencies

Tables 3-1 to 3-3 illustrate the characteristics of surveyed agencies. Personnel staffing illustrates the diversity of funded state air pollution control agencies. Agencies with as few as two and as many as 72 were interviewed. Interestingly, the agency funded for only 18 positions has more pollutant-AQMA designations than the agency funded for 324 positions. Positions most directly involved in AQMP analysis are engineers, meterologists and data processing specialists. The diversity of funding is even greater when these groups are totaled with only 3 positions funded in the least comprehensive agency and 88 positions funded in the most comprehensive agency.

In terms of agency budgeting, EPA's grant for the most comprehensive agency totaled 1.7 million dollars. The total agency budget including federal and non-federal funding exceeded 7.5 million dollars. Five and one-half million dollars went to personnel and fringe benefits.

The following is a brief description of each agency.

Table 3-1. State Agency Location Characteristics

| | Agency Demographic/Geographic Characteristics | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Location | South-East | East | North-East | Mid-West | North-West | South-West | West |
| Population of State (thousands) | 4,590 | 3,922 | 5,689 | 3,805 | 694 | 11, 197 | 1, 059 |
| Land Area (Thousands of square miles) | 58.9 | 10.6 | 8.2 | 84.1 | 147.1 | 267.3 | 84.9 |
| EPA Region | IV | III | I | V | VIII | VI | VIII |

Source: 1970 Census figures.

Table 3-2. State Agency AQMAs.

| | Number of Designated Air Quality Maintenance Areas in State | | | | | | |
|---|---|---|---|---|---|---|---|
| Pollutant | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Particulates | 4 | 3 | 4 | 2 | 5 | 5 | 7 |
| $SO_2$ | | 1 | 1 | 1 | 4 | 1 | 6 |
| CO | | | | | 2 | | |
| Oxidents | | 2 | 2 | | | 6 | |
| $NO_2$ | | | | | | | |
| TOTAL | 4 | 6 | 7 | 3 | 11 | 12 | 13 |

Source: Guidelines for Air Quality Maintenance Planning, Volume 14: Designated Air Quality Maintenance Areas. Report No. EPA-450/4-75-002. December 1975.

Table 3-3. State Agency Staffing

| | Agency Staffing | | | | | | |
|---|---|---|---|---|---|---|---|
| Position | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Management | 1 | 2 | 4 | 2 | 1 | 7 | 2 |
| Engineers | 19 | 31 | 37 | 12 | 3 | 72 | 2 |
| Meterologists | 1 | 1 | 1 | - | 3 | 3 | 1 |
| Data Processing Specialists | 3 | 4 | 5 | 2 | 1 | 13 | - |
| Other Technial Staff | 7 | 18 | 12 | 12 | 9 | 65 | 7 |
| Inspectors | 35 | 14 | 33 | - | - | 89 | 2 |
| Office and Other Non-Technical Staff | 7 | 15 | 10 | 4 | 2 | 75 | 4 |
| TOTAL | 73 | 85 | 102 | 32 | 19 | 324 | 18 |

Source: 1976-77 Directory of Government Air Pollution Agencies. Published by the Air Pollution Control Association.

Agency #1

Located in the south eastern United States, this agency addresses environmental problems typical of agricultural sunbelt states. Particulate and area emissions is the prime concern although one urban area in the state has a CO-oxidant problem. The agency is sufficiently staffed to handle technical issues requiring advanced analytical techniques.

Agency #2

Located in the eastern United States, this agency encounters environmental emissions similar to those in mid-atlantic states. Air quality attainment and maintenance depends heavily on control of areawide urban emissions and control of selected large point sources throughout the state. Agency #2 is adequately funded, has a reputation as a well-managed agency and appears to display depth in experience and technical ability. Regional planning agencies are well developed in urban areas; as a result,local planning agencies are developing AQMP's for the two urbanized AQMA's. The state agency is coordinating local plans and conducting the analysis in rural areas designated for particulates. Contractors and consultants have been employed for specific AQMA related projects such as conducting an AQMA run of a metropolitan area.

Agency #3

Located in the northeast, agency #3 must control urban emissions as well as widespread industrial point sources. Rural sections of the state do not appear to present difficult environmental control problems, so that most of the agencies resources are focused on the industrialized sections of the state. While the agency appears adequately staffed, outside contractors have been used extensively in all aspects of AQMP analysis. Growth projections for both area and point sources as well as emissions allocations were conducted via contractor. Plan development is on schedule with no significant problems.

Agency #4

Agency #4 is located in the upper mid-west. Pollutant problems are primarily fugitive dust and point source $SO_2$. While the agency is small, the staff appears to be well trained and experienced to conduct any technical analysis required by AQMP. Contractors and consultants have been used for specific projects but most of the AQMP work will be completed in-house.

Agency #5

Located in the northwestern coal belt, most environmental problems are with large primary resource oriented industries. Coal, copper and fertilizer plants create 6 AQMA's with a total of 11 pollutant-AQMA plans. Particulate and $SO_2$ emissions from large point sources are the chief contributors to poor air quality. Large fugitive emissions also make air quality maintenance difficult. Because of its rapid development and large size, this state has difficulty obtaining adequate air quality data. Projecting future emissions is especially difficult because of rapid energy development. OBERS projections used by a contractor for AQMP have been supplemented with local university growth projection and national estimates. Growth and projected future emissions appears to be the weakest aspect of the analysis. Despite a large number of AQMA's and low staffing this agency is taking an agressive approach to developing a technical capability.

Agency #6

Agency #6 is located in the southwestern United States. The agency is among the largest in the country with a budget exceeding 7.5 million dollars. The primary issue in this agency is the measurement and control of fugitive dust. Fugitive dust from dirt roads and vacant land is typical in the southwest and remains the single most important issue to control agencies. Since attainment has been of most concern to the state agency, maintenance planning work is still in the planning stage. It has not been determined if the agency will employ contractual help. With 4 computer operators, 4 systems analysts, 8 programmers, and 3 meterologists, the agency displays technical depth adequate to develop the plans internally.

Agency #7

Located in a sparsely populated western state, this agency is one of the smallest in the country. Fugitive dust from unpaved roads, desert and energy development areas is of prime concern. Despite a small staff, agency #7 has sufficient technical capability to conduct AQMP analysis. All seven particulate plans have been completed with work on six $SO_2$ plans proceeding. Like other western states, 208 agencies are coordinating and providing data to the air pollution control agency.

### 3.2.3. Contractors

In addition to the state air pollution control agencies, two regional planning agencies serving as contractors in the AQMA analyses were interviewed. This was designed to broaden the perspective to include groups conducting AQMA analyses outside of the framework of state government. These agencies can be characterized as follows.

Contractor A

Contractor A is a planning organization located in a large eastern urban community. This agency has taken the prime role in AQMP analysis for the city. The state air pollution control agency has provided data and limited technical support to the agency.

Contractor B

Contractor B is a regional planning agency located in the east. Contractor B differs from A in that its scope includes a large region composed of several urban communities and additional rural areas. The entire AQMP was developed by the regional planning agency. Within this agency are many other planning functions including 208 planning. Many of the calculations in the analysis were made by computerized routines developed in-house.

## 4. SYSTEM REQUIREMENTS

The structure of the air quality maintenance planning regulations[14] sets specific requirements on the type of information that must be included in both the AQMA Analysis and the AQMA Plan. These requirements prescribe the data that must be retreivable from a CEPA system and the type of calculation procedures that must be used in generating that data. In turn, these requirements imply that certain input information must be processed by the system. EPA's calls for SIP revision[15] also defines time schedules on which the Analyses Plans are due. This fixes one of the constraints that is imposed on system availability. Finally, the OMB, GSA, and EPA circulars dealing with procurement of computer hardware and software prescribe the general administrative requirements that must be next. Each of these requirements will be discussed in turn.

### 4.1. OUTPUT REQUIREMENTS

The AQMA analysis regulations require the use of the techniques described in Volume 7 of the guideline series[7] to project emissions on a county level. The format in which this information is to be summarized is given on Fig. 4-1 (Table 7-1 from Ref. 7). The data are to be presented for at least the baseline year, one intermediate year, and the tenth year of the planning horizon. The information covers six basic emission source categories: fuel combustion - external and internal, industrial process, solid waste disposal, transportation, and miscellaneous. There are 125 subcategories that must be considered (although some analysis areas will not have any sources in these categories) for the designated pollutants.

The regulations also require the use of the techniques in Volume 13 of the guideline series[13] to allocate the emissions to subcounty areas. The format of the data summary is shown on Fig. 4-2 (Table 4-2 from Ref. 13). Emissions of only the pollutants for which the area has been designated are required. The number of master grid squares depends on the gridding procedure. The test case in Ref. 13 used 123, one state used 4000 grids to cover the entire state, and another state used 394 grids to cover 3 counties.

COUNTY ____________
YEAR ____________

| SOURCE | | | | EMISSIONS, TONS PER YEAR | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | PART | SOX | NOX | HC | CO |
| FUEL COMBUSTION: EXTERNAL | RESIDENTIAL FUEL (AREA) | ANTHRACITE COAL | | | | | | |
| | | BITUMINOUS COAL | | | | | | |
| | | DISTILLATE OIL | | | | | | |
| | | RESIDUAL OIL | | | | | | |
| | | NATURAL GAS | | | | | | |
| | | WOOD | | | | | | |
| | | TOTAL | | | | | | |
| | ELECTRIC GENERATION (POINT) | ANTHRACITE COAL | | | | | | |
| | | BITUMINOUS COAL | | | | | | |
| | | LIGNITE | | | | | | |
| | | RESIDUAL OIL | | | | | | |
| | | DISTILLATE OIL | | | | | | |
| | | NATURAL GAS | | | | | | |
| | | PROCESS GAS | | | | | | |
| | | COKE | | | | | | |
| | | SOLID WASTE/COAL | | | | | | |
| | | TOTAL | | | | | | |
| | INDUSTRIAL FUEL | ANTHRACITE COAL | AREA | | | | | |
| | | | POINT | | | | | |
| | | BITUMINOUS COAL | AREA | | | | | |
| | | | POINT | | | | | |
| | | LIGNITE | POINT | | | | | |
| | | RESIDUAL OIL | AREA | | | | | |
| | | | POINT | | | | | |
| | | DISTILLATE OIL | AREA | | | | | |
| | | | POINT | | | | | |
| | | NATURAL GAS | AREA | | | | | |
| | | | POINT | | | | | |
| | | PROCESS GAS | AREA | | | | | |
| | | | POINT | | | | | |
| | | COKE | POINT | | | | | |
| | | WOOD | AREA | | | | | |
| | | | POINT | | | | | |
| | | LIQUID PETROL GAS | POINT | | | | | |
| | | BAGASSE | POINT | | | | | |
| | | OTHER | POINT | | | | | |
| | | TOTAL | AREA | | | | | |
| | | | POINT | | | | | |

Fig. 4.1. Sample Emission Summary Form

| SOURCE | | | | PART | SOX | NOX | HC | CO |
|---|---|---|---|---|---|---|---|---|
| FUEL COMBUSTION: EXTERNAL (CONTINUED) | COMMERCIAL-INSTITUTIONAL FUEL | ANTHRACITE COAL | AREA | | | | | |
| | | | POINT | | | | | |
| | | BITUMINOUS COAL | AREA | | | | | |
| | | | POINT | | | | | |
| | | LIGNITE | POINT | | | | | |
| | | RESIDUAL OIL | AREA | | | | | |
| | | | POINT | | | | | |
| | | DISTILLATE OIL | AREA | | | | | |
| | | | POINT | | | | | |
| | | NATURAL GAS | AREA | | | | | |
| | | | POINT | | | | | |
| | | WOOD | AREA | | | | | |
| | | | POINT | | | | | |
| | | LIQUID PETROL GAS | POINT | | | | | |
| | | OTHER | POINT | | | | | |
| | | TOTAL | AREA | | | | | |
| | | | POINT | | | | | |
| | OTHER | | POINT | | | | | |
| | TOTAL EXTERNAL COMBUSTION | | AREA | | | | | |
| | | | POINT | | | | | |
| FUEL COMBUSTION: INTERNAL | ELECTRIC GENERATION | DISTILLATE OIL | | | | | | |
| | | NATURAL GAS | | | | | | |
| | | DIESEL | | | | | | |
| | | OTHER | | | | | | |
| | | TOTAL | | | | | | |
| | INDUSTRIAL FUEL | DISTILLATE OIL | | | | | | |
| | | NATURAL GAS | | | | | | |
| | | GASOLINE | | | | | | |
| | | DIESEL | | | | | | |
| | | OTHER | | | | | | |
| | | TOTAL | | | | | | |
| | COMMERCIAL-INSTITUTIONAL FUEL | DIESEL | | | | | | |
| | | TOTAL | | | | | | |
| | ENGINE TESTING | AIRCRAFT | | | | | | |
| | TOTAL INTERNAL COMBUSTION | | | | | | | |
| TOTAL FUEL COMBUSTION | | AREA | | | | | | |
| | | POINT | | | | | | |

Fig. 4.1. (cont'd)

| SOURCE | | | | PART | SOX | NOX | HC | CO |
|---|---|---|---|---|---|---|---|---|
| INDUSTRIAL PROCESS (POINT) | CHEMICAL MANUFACTURING | | | | | | | |
| | FOOD/AGRICULTURE | | | | | | | |
| | PRIMARY METAL | | | | | | | |
| | SECONDARY METALS | | | | | | | |
| | MINERAL PRODUCTS | | | | | | | |
| | PETROLEUM INDUSTRY | | | | | | | |
| | WOOD PRODUCTS | | | | | | | |
| | PROCESS EVAPORATION | | | | | | | |
| | METAL FABRICATION | | | | | | | |
| | LEATHER PRODUCTS | | | | | | | |
| | TEXTILE MANUFACTURING | | | | | | | |
| | INPROCESS FUEL | | | | | | | |
| | OTHER/NOT CLASSIFIED | | | | | | | |
| | TOTAL | | | | | | | |
| SOLID WASTE DISPOSAL | GOVERNMENT (POINT) | MUNIC. INCIN. | | | | | | |
| | | OPEN BURNING | | | | | | |
| | | OTHER | | | | | | |
| | | TOTAL | | | | | | |
| | RESIDENTIAL (AREA) | ON-SITE INCIN. | | | | | | |
| | | OPEN BURNING | | | | | | |
| | | TOTAL | | | | | | |
| | COMMERCIAL-INSTITUTIONAL | ON-SITE INCIN-ERATION | AREA | | | | | |
| | | | POINT | | | | | |
| | | OPEN BURNING | AREA | | | | | |
| | | | POINT | | | | | |
| | | APARTMENT | POINT | | | | | |
| | | OTHER | AREA | | | | | |
| | | | POINT | | | | | |
| | | TOTAL | AREA | | | | | |
| | | | POINT | | | | | |
| | INDUSTRIAL | ON-SITE INCIN-ERATION | AREA | | | | | |
| | | | POINT | | | | | |
| | | OPEN BURNING | AREA | | | | | |
| | | | POINT | | | | | |
| | | AUTO BODY INCIN. | POINT | | | | | |
| | | OTHER | POINT | | | | | |
| | | TOTAL | AREA | | | | | |
| | | | POINT | | | | | |
| | TOTAL SOLID WASTE DISPOSAL | | AREA | | | | | |
| | | | POINT | | | | | |

Fig. 4.1. (cont'd)

| SOURCE | | | | PART | SOX | NOX | HC | CO |
|---|---|---|---|---|---|---|---|---|
| TRANSPORTATION (AREA) | LAND VEHICLES | GASOLINE | LIGHT DUTY | | | | | |
| | | | HEAVY DUTY | | | | | |
| | | | OFF HIGHWAY | | | | | |
| | | | TOTAL | | | | | |
| | | DIESEL | HEAVY DUTY | | | | | |
| | | | OFF HIGHWAY | | | | | |
| | | | RAIL | | | | | |
| | | | TOTAL | | | | | |
| | AIRCRAFT | MILITARY | | | | | | |
| | | CIVIL | | | | | | |
| | | COMMERCIAL | | | | | | |
| | | TOTAL | | | | | | |
| | VESSELS | BITUMINOUS COAL | | | | | | |
| | | DIESEL FUEL | | | | | | |
| | | RESIDUAL OIL | | | | | | |
| | | GASOLINE | | | | | | |
| | | TOTAL | | | | | | |
| | GAS HANDLING EVAPORATION LOSS | | | | | | | |
| | TOTAL TRANSPORTATION | | | | | | | |

Fig. 4.1. (cont'd)

| SOURCE | | | PART | SOX | NOX | HC | CO |
|---|---|---|---|---|---|---|---|
| MISCELLANEOUS (AREA) | SOLVENT EVAPORATION | INDUSTRIAL SOURCES (AREA) | | | | | |
| | | DRY CLEANING | | | | | |
| | | | | | | | |
| | | | | | | | |
| | FIRES | STRUCTURAL | | | | | |
| | | FROST CONTROL | | | | | |
| | | SLASH BURNING | | | | | |
| | | WILD FOREST | | | | | |
| | | AGRICULTURAL | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | DUST CAUSED BY HUMAN AGITATION OF THE AIR | UNPAVED ROADS | | | | | |
| | | UNPAVED AIRSTRIPS | | | | | |
| | | PAVED ROADS | | | | | |
| | | MINERAL PROCESSING | | | | | |
| | | TILLING ACTIVITIES | | | | | |
| | | LOADING CRUSHED ROCK, SAND, GRAVEL | | | | | |
| | | CONSTRUCTION | | | | | |
| | | | | | | | |
| | | | | | | | |
| | AIRBORNE DUST CAUSED BY NATURAL WINDS | STORAGE PILES | | | | | |
| | | TILLED LAND | | | | | |
| | | UNTILLED LAND | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| GRAND TOTAL | AREA | | | | | | |
| | POINT | | | | | | |

Fig. 4.1. (cont'd)

A. County ____________
B. Year ____________

| | Emissions (tons/yr) | | | | |
|---|---|---|---|---|---|
| (1) Master Grid Designation | (2) Part. | (3) $SO_x$ | (4) CO | (5) HC | (6) $NO_x$ |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |

Fig. 4.2. Sample Emission Allocation Summary

The techniques for projection and allocation[7,13] are not in themselves exceptionally difficult. Projection techniques rely on either direct information about planned growth in emission sources (e.g., capacity addition plans of a power plant) or an indirect information about surrogate variables (e.g., employment projections). In the first instance, an emission factor is applied to the new capacity addition and this represents the forcasted emissions. In the second case, a growth factor is generated by taking the ratio of projected employment to baseline employment, applying this to the source activity level, and again applying an emission factor. The procedure is complicated somewhat by the consideration of things like plant retirements, increased utilization of maximum plant capacity (in which case the growth is subject to SIP regulations and not New Source Performance Standards), and growth that cannot be identified with specific source categories.

Likewise, the allocation procedure is not a conceptually difficult task since the technique is to develop an allocation parameter based on area, population, or other variable and to apportion the countywide emissions to the subcounty area on the basis of this parameter.

What is a more significant consideration than the complexity of the calculation is the volume of the calculations. The number of source categories (125), the number of pollutants (1-5), the number of projection years (at least 3), and the number of grid cells multiplicatively combine to generate a large number of pieces of information that must be handled. On top of this must be added the evaluation of alternative control strategies in which the process of projection and allocation must be repeated for at least part of the source inventory.

There is a trade-off that can be made to satisfy the requirements of the regulations and, at the same time, remain within budegtary and time constraints. The regulations allow for varying levels of sophistication to be used in the analyses to reduce the demands placed on state and local agency resources. In practice this means that the complexity of the calculations can be reduced by using aggregated data sources, ignoring the details of certain calculations, and relying on the most readily available sources of information. The volume of the calculations can also be reduced through using larger grid squares and fewer allocation variables.

The use of a computerized emission projection and allocation scheme must be viewed in the light of the regulatory framework. The output requirements can be met, in many ways, through the use of simplified calculation procedures and with minimal spatial resolution and requiring only small, if any, computer capability. The availability of a CEPA system can be viewed, in this instance, as a means of upgrading the sophistication, and presumably the accuracy, of the analysis. An alternative perspective is to view the CEPA system as a tool to permit the analysis of those complex situations where manual computations are totally inadequate (e.g., large metropolitan areas with a great deal of data). A third perspective is to consider the reduction in resource requirements that a CEPA system might result in if, for example, a significant amount of agency staff time could be spared from the performance of the calculations.

These three considerations are among the fundamental questions that were addressed in determining CEPA system need through the agency interviews. Summarily stated they are:

1. Will the CEPA system result in an increase in the sophistication of the analyses submitted under the regulatory requirements?

2. Will the CEPA system permit the analysis of complex problems that could not be otherwise handled in accordance with regulatory requirements?

3. Will the CEPA system reduce the resource requirements of state and local agencies?

## 4.2. INPUT REQUIREMENTS

The generation of the data in Figs. 4-1 and 4-2 requires the processing of a considerable amount of input information. This information can be grouped into two basic sets: emission inventory and planning data as shown on Table 4-1.

### 4.2.1. Point Source File

The point source information is generally obtained by means of a survey questionnaire to all major sources. This represents a considerable amount of effort to review the forms and evaluate the data. Some of the

Table 4-1. Input Data Required for Air Quality Maintenance Planning

| Data Set | Information Contained |
|---|---|
| Emission Inventory | **Point Source File** |
| | Source identification and location |
| | Stack data - height, diameter, exhaust temperature, exhaust flow rate |
| | Control equipment - type, efficiency |
| | Operating parameters - throughput, fuel parameters |
| | Emission rate - estimated, stack tests, allowable |
| | Compliance schedule |
| | **Area Source File** |
| | Fuel Consumption |
| | Solid waste generation |
| | Vehicle miles travelled |
| | Aircraft LTO cycles |
| | Solvent use |
| | Gasoline marketed |
| | Fugitive dust generation |
| Planning Data | Population |
| | Employment |
| | Land Use |
| | Earnings |
| | Energy Consumption |
| | Transportation System Plans |

seven states interviewed conduct a survey of all sources every one or two years while for others, the AQMA effort represents the first major update of the point source inventory since the original SIP development. All states have available to them the National Emissions Data System (NEDS) computer codes, which can be used to process this large volume of information. These codes are available for use on the EPA's computer facility in North Carolina. In addition, many states have developed their own computerized emission inventory routines that either follow the NEDS format or use individualized formats. These routines have been developed to give the states more control in analyzing the data and to overcome the time lags in processing data through EPA's North Carolina facility. Some states have developed routines to translate their own emission inventory format into NEDS format for submission to EPA.

In terms of CEPA system requirements, it is immediately apparent that an interface with point source emission inventory data files and programs is a critical issue. From the standpoint of universal acceptance, compatability with the NEDS system is mandatory. At the same time, the possibility for interfacing with other emission inventory formats must also be left open.

### 4.2.2. Area Source File

The area source emission inventory presents a much more complex picture because of the diversity of sources and the wide range of information needed to estimate emissions. Although the volume of information is not nearly as great as for the point sources, the complexity of the source characterizations generates an almost equivalent problem in terms of resource requirements to make credible emission estimates. In most of the interviewed states the point source emission inventory can be and is being done at the highest level of detail (i.e., Level 3 in Ref. 7) while the area source inventory requires lower levels of detail because of data collection and verification problems.

The NEDS system has the capability to handle area source emissions on a countywide basis. There are also a number of peripheral routines that enable the data to be summarized in a variety of ways. However, the NEDS area source system does not provide an adequate method for handling the information needed to make the calculations required in Refs. 7 and 13. The principle difficulty is the lack of spatial resolution finer than the county level. Only the simplest of allocation methods would have to be used to obtain a more spatially detailed inventory. Another problem is the lack of resolution in the source categories themselves. Sources are grouped into rather broad categories that do not lend themselves well to the needs of AQMA planning. For example, a control strategy aimed at converting residential apartment buildings from burning residual oil to burning distillate oil could not be tested using only NEDS area source data, since all residential fuel oil use is aggregated. In essence, the NEDS area source routines serve as a useful summary of emission information but do not provide the necessary detail.

In terms of a CEPA system requirement, the incentive to interface with NEDS area source data is not as strong as with the point source data. The CEPA system must be able to process the more detailed and extensive data that is needed to make area source emission estimates and growth projections. It might be noted parenthetically here that one state agency visited suggested that the CEPA system be used to maintain a file of data (e.g., fuel use, population, dwelling units, etc.) that the states could access to update their own inventories. This concept more closely describes a modification of NEDS that might be considered.

### 4.2.3. Planning Data

The Air Quality Maintenance Planning effort represents the first time that air quality management has been integrated with local and regional planning efforts. The original SIPs were not required to delve into the details of projected growth and development; there is, therefore, no systematic set of planning data that is available for AQMA analyses. There is also no systematic set of computer routines that can be applied to handle this information in a fashion analagous to the NEDS routines.

The development of a good AQMA analysis requires the use of planning data from a variety of agencies and planning programs, such as 3-C transportation planning, 208 wastewater planning, HUD 701 planning, and others. Some of the information is available in standard format in many areas (e.g., census data on population, housing, employment). In most cases, however, the planning data are handled in a fashion that is unique to the local area. For example, one planning agency will project growth on the basis of employment, another will use earnings by industrial category, and yet another will use land use. In some instances the data are available in a computer-readable format, while in others only hard copy data are available.

Despite the rather amorphous nature of the planning information, the agencies doing AQMA analyses are required to incorporate, wherever possible, the inputs of local planning efforts. The regulations specifically call for coordination among various planning agencies and for the use of common data bases as one means of achieving this coordination. Two CEPA system requirements result from these considerations that are not necessarily compatible. On one hand, the CEPA system can be viewed as a mechanism to enhance the integration of planning data into the air quality management process. As one state representative observed, the availability of computerized emission projection and allocation procedures opens the door to whole new sets of planning data that could not be handled manually. On the other hand, the diverse nature of the planning data formats presents serious problems in designing a system that is powerful enough to manipulate the data effectively but is general enough to adapt to different data sets. This is a non-trivial problem that would have to be solved in system design.

## 4.3. CEPA SYSTEM TIMING REQUIREMENTS

Data pertaining to the timing of CEPA system development came from a variety of independent sources. Federal Registers were reviewed first, Regional Offices were surveyed, state air pollution control agencies were interviewed, and two regional planning organizations were surveyed. All of the sources provided the same general conclusion. CEPA development should have been completed in early 1975 to be widely used. If it could have been developed by the end of 1976, a CEPA system would have been of limited use during the initial state AQMA analysis. Potential use does increase slightly, however, if the CEPA system is considered as a means to recheck already completed plans. Perhaps the greatest potential for CEPA application, considering submission schedules, is the use of CEPA subroutines to aid in non-attainment plan revision. Over 120 AQCR portions could use a CEPA subroutine for land use analysis if it were made available by early 1978.

### 4.3.1. Federal Register Due Dates For Submittal of Air Quality Analysis and Plans

The Federal Register provides the most detailed look at AQMP analysis and plan scheduling on a national basis. AQMP work for scheduling purposes can be subdivided into 8 separate milestones.[15] Due dates, some of which coincide, include:

Due date for analysis in air quality maintenance areas, set 1 pollutants.

Due date for analysis in air quality maintenance areas, set 2 pollutants.

Due date for plan revisions in air quality maintenance areas, set 1 pollutants.

Due date for plan revisions in air quality maintenance areas, set 2 pollutants.

Due date for plan revisions in non-attainment areas, set 1 pollutants.

Due date for plan revisions in non-attainment areas, set 2 pollutants.

Due dates for plan revisions in non-attainment areas requiring land use and/or transportation controls, set 1 pollutants.

Due dates for plan revisions in non-attainment areas requiring land use and/or transportation controls, set 2 pollutants.

Of the eight milestones published in the Federal Register, the most important for CEPA development is the analysis due date in air quality maintenance areas, set 1 and set 2 pollutants. State interviews indicate that analysis and planning actually begins six to eight months prior to submittal dates. An analysis submission date of first quarter 1977 demands a program plan which begins in mid-1976. Use of a CEPA system would require development and distribution of the programs prior to initiation of the analysis. A possibility exists that the CEPA could be used to recheck the analysis,giving the system limited utility at least until the plan revision due date. After plans are submitted,the only use a CEPA might see for AQMA analysis might be Regional Office checking of completed plans; however, this is not a likelihood since none of the Regional Offices indicated that their plan review would include analyses requiring a CEPA. Table 4-2 presents a regional summary of maintenance analysis and plan submittal dates for set 1 and set 2 pollutants. This data has been illustrated by a cumulative distribution curve in Fig. 4-3. Assuming a six month preparation period for AQMA analyses, Fig. 4-3 illustrates that 77% of the states will be unable to use a CEPA for set 1 pollutants if it was made available by January 1977. This number increases to 88% if the CEPA is not available until mid-1977. This would represent about 9 AQMA's where CEPA had direct use for AQMA analysis.

For set 2 pollutants only 48% of the AQMA's would have completed plans if the CEPA system were ready by January 1977. By mid-1977, 62% of the AQMA's would have used an alternative approach. Eight AQMA's could use the CEPA system for set 2 pollutants if it were available by mid-1977. Looking at the latest date which a CEPA system must be distributed for state use, all of the agenices will have committed themselves during the first quarter of 1978. If a CEPA system were available by mid-1977, 17 AQMA's could use a CEPA system for set 1 or set 2 pollutant analysis. These figures support state interviews concerning the potential usefulness of a CEPA system for use in the first round of AQMA analysis efforts.

Although development of a CEPA system by mid-1977 may be useful to only a few states for the initial analysis, it could have slightly greater use for rechecking plans. Table 4-2 and Figure 4-4 indicate that a CEPA system available by the end of 1977 or early 1978 could be useful in checking

Table 4-2. Due Dates for Submittal of Air Quality Maintenance Analyses and Plans

| EPA Region/ Pollutant Set[a] | | Number of AQMAs | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Analysis Due Date | | | | | | | | | | Plan Due Date | | | | | | | | | | | |
| | | 1976 | | 1977 | | | | 1978 | | | | 1976 | | | 1977 | | | | 1978 | | | | |
| | | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | Sub-mitted | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | Not Established |
| I | Set 1 | | 5 | | | | | | | | | | | | | | | | | | 6 | | |
| | Set 2 | | 0 | | | | | | | | | | | | | | 4[b] | | | | 8[b] | | |
| II | Set 1 | | 16 | 3 | 1 | 7 | | | | | | | | | | | 3 | 12 | 4 | | 8 | | |
| | Set 2 | | | | 1 | 2 | | | | | | | | | | | | | | | 3 | | |
| III | Set 1 | | | | | | | | | | | | | | | | 15 | | | | | | |
| | Set 2 | | | | | | | | | | | | | | | | 13[b] | | | | | | |
| IV | Set 1 | | | | | | | | | | | | | | | | 5[c] | | | | | | |
| | Set 2 | | | | | | | | | | | | | | | | 5 | | | | | | |
| V | Set 1 | 4 | 4 | 10 | 5[c] | 1 | | 2[d] | | | | | | | | | 24[c] | | | | 2[d] | | |
| | Set 2 | | 6[b] | | | 1 | | | | | | | | | | | 9[b] | | | | | | |
| VI | Set 1 | | | | | | | | | | | 2 | | | | | | | | | | | 10 |
| | Set 2 | | | | | | | | | | | 2 | | | | | | | | | | | 6 |
| VII | Set 1 | | | | | | | | | | | | | | | | 9 | | | | | | |
| | Set 2 | | | | | | | | | | | | | | | | 1 | | | | | | |
| VIII | Set 1 | | | 3[e] | | | | | | | | | | | | | 14 | | | | | | 1 |
| | Set 2 | 1 | | | | | | | | | | | | | | | 2 | | | | | | 1 |
| IX | Set 1 | | 1 | | | | | | | 7 | | | | | | | | | 1[f] | | | | 7 |
| | Set 2 | | | | | | | | | 8 | | | | 1 | | | 2 | | | | | | 9 |
| X | Set 1 | | 6 | | | | | | | | | | | | | | | | | | 8[c] | | |
| | Set 2 | | 2 | | | | | | | | | | | | | | | | | | 2 | | |
| Total | Set 1 | 4 | 32 | 16 | 6 | 8 | | 2 | | 7 | | 2 | | | | | 70 | 12 | 5 | | 24 | | 18 |
| | Set 2 | 1 | 8 | | 1 | 3 | | | | 8 | | 2 | | 1 | | | 36 | | | | 13 | | 16 |

[a] Set 1 pollutants are TSP, $SO_2$; Set 2 pollutants are CO, HC, $NO_x$, $O_x$.

[b] Includes statewide revisions for oxidant control.

[c] Includes 2 counties not designated AQMAs.

[d] Includes 1 county not designated an AQMA.

[e] Includes 2 cities and the remainder of a state excluding AQMAs.

[f] Includes 1 AQCR not designated an AQMA.

Source: Ref. 15

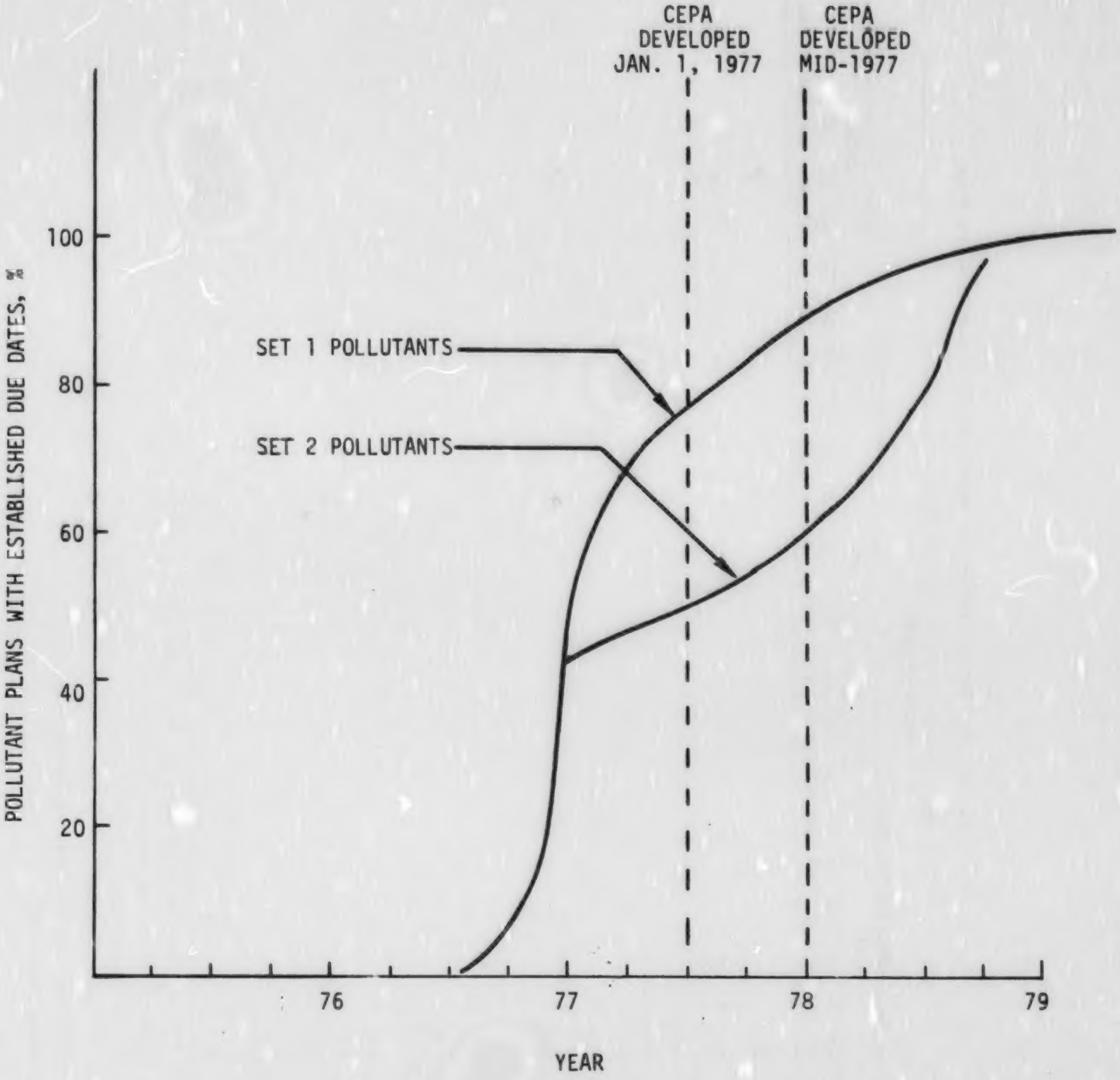

Fig. 4-3. Cumulative Frequency of Due Dates for Submittal of Air Quality Maintenance Analysis.

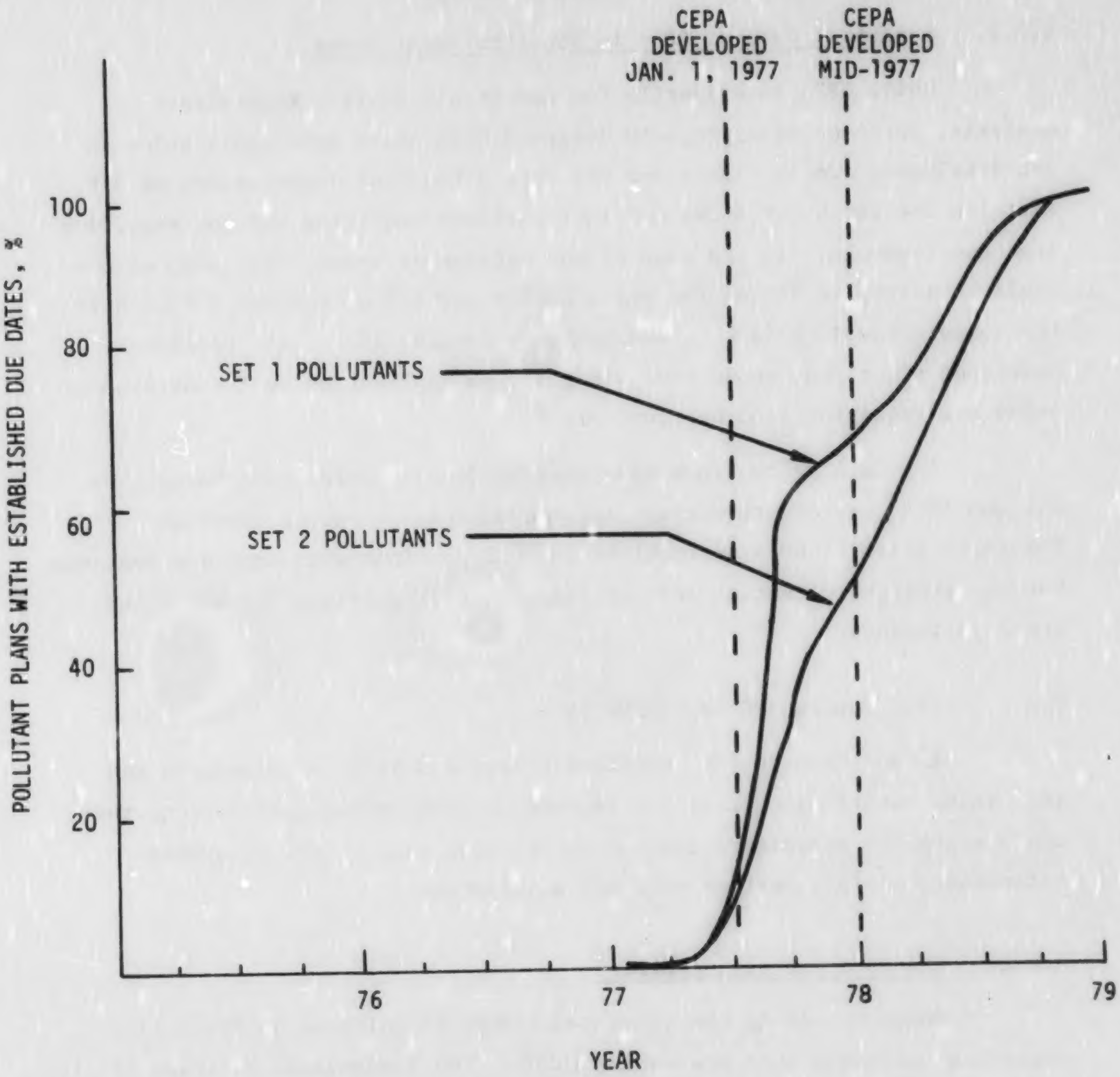

Fig. 4-4. Cumulative Frequency of Due Dates for Submittal of Air Quality Maintenance Plans

24 set 1 plans and 13 set 2 plans before submittal. State interviews indicated that available time between analysis and submittal would be spent rechecking and revising the analysis. Several states indicated they would consider using a CEPA system for this activity.

### 4.3.2. Potential Uses of CEPA in Non-Attainment Areas

While CEPA is primarily for use in Air Quality Maintenance Analysis, portions of a properly designed CEPA could have application in non-attainment areas. Table 4-3 presents a regional distribution of SIP revision due dates for AQCRs and AQCR portions requiring and not requiring land use controls. In the case of non-attainment areas, CEPA subroutines could be useful in 96% of the set 1 AQCR's and 95% of the set 2 AQCR's if the computational tools were available by January 1977. Any routines developed after that would have virtually no application in non-attainment areas not requiring land use controls.

Any CEPA subroutines developed by January 1978 could be used by all the AQCR portions requiring land use or transportation controls. The application of CEPA subroutines in AQCR portions with land use controls has the greatest potential use totaling 122 AQCR portions for set 1 and set 2 pollutants.

## 4.4. DATA PROCESSING REQUIREMENTS

In addition to the technical output and input requirements and the timing restrictions that are imposed on CEPA system utilization, there are a number of administrative conditions that must be met in system definition, design, performance, and acquisition.

### 4.4.1. EPA Data Processing Policy

Reference 17 is the principal source of guidance on EPA policy regarding automatic data processing (ADP). The fundamental policies are to:

a. Supply the Agency with sufficient yet the most advanced ADP and systems technology feasible.

b. Assure management that the allocations of ADP resources for each system will consider cost/benefit analysis.

c. Work towards the integration and coordination of information systems across media, functional, and program lines.

Table 4-3. Due Dates for Submittal of SIP Revisions in Non-Attainment Areas

| EPA Region/ | Pollutant Set[b] | Sub-mitted | No Land Use or Transportation Plan Required | | | | | | | | | | Land Use and/or Transportation Required | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1976 | | 1977 | | | | 1978 | | | | 1976 | | 1977 | | | | 1978 | | | | |
| | | | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | Not Established |
| I | Set 1 | | | | | 1 | 9 | | | | | | | | | | | | | | | | |
| | Set 2 | | | | | | 6[c] | | | | | | | | | | | | | | | | |
| II | Set 1 | | | | | | 11 | | | | | | | | | | | | | | 11 | | |
| | Set 2 | | | | | | 12 | | | | | | | | | | | | | | 12 | | |
| III | Set 1 | | | | | | 11 | | | | | | | | | | | | | | 11 | | |
| | Set 2 | | | | | | 11[c] | | | | | | | | | | | | | | 11[c] | | |
| IV | Set 1 | | | | | | 3 | | | | | | | | | | | | | | 3 | | |
| | Set 2 | | | | | | 5 | | | | | | | | | | | | | | 5 | | |
| V | Set 1 | | | | | | 13 | | | | | | | | | | | | | | 13 | | |
| | Set 2 | | | | | | 9[c] | | | | | | | | | | | | | | 9[c] | | |
| VI | Set 1 | | 2 | | | | 17 | | | | | 1 | | | | | | | | | 17 | | 1 |
| | Set 2 | | 2 | | | | 5 | | | | | | | | | | | | | | 5 | | |
| VII | Set 1 | | | | | | 9 | | | | | | | | | | | | | | 9 | | |
| | Set 2 | | | | | | 2 | | | | | | | | | | | | | | 0 | | |
| VIII | Set 1 | | | | | | 14 | | | | | | | | | | | | | | 14 | | |
| | Set 2 | | | | | | 2 | | | | | | | | | | | | | | 2 | | |
| IX | Set 1 | | | | | | 7 | | 1 | | | | | | | | | | | | | | |
| | Set 2 | | | 1 | | | 8 | | | | | | | | | | | | | | | | |
| X | Set 1 | | | | | | 7 | | | | | | | | | | | | | | | | |
| | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Total | Set 1 | | 2 | | | | 101 | | 1 | | | 1 | | | | | | | | | 78 | | 1 |
| | Set 2 | | 2 | 1 | | | 61 | | | | | | | | | | | | | | 44 | | |

[a] Includes AQCRs and parts of AQCRs.

[b] Set 1 pollutants are TSP, $SO_2$. Set 2 pollutants are CO, HC, $NO_x$, $O_x$.

[c] Includes statewide revisions for oxidant control.

Source: Ref. 15.

d. Make optimum use of centrally provided ADP resources.

e. Assure compliance with Federal directives which have a bearing upon the management of ADP and systems resources.

f. Provide adequate security for proprietary/privileged information maintained in automated systems.

In carrying out these policies a five-step process of acquiring ADP systems is defined. These steps are:

1) Feasibility study
2) System design specification
3) System development and implementation
4) System operation and maintenance
5) Periodic review and audit.

Phases 1 and 2 of this contract work are aimed at satisfying the first step requirements. Phase 3, if conducted, will address the second step. Several of the requirements of the feasibility study have special bearing on the CEPA system. The feasibility study must determine that a proposed ADP system has special features among which are:

1) "The performance of new work, or the rendering of better and more timely service or products to both the Government and the public, which is necessary but was not feasible to accomplish within the limitations of the previous system. (Example: scientific and engineering applications which involve a depth of calculation or analysis not practical by any other method.)"

2) "The integration of basic data, common to many functions, into a single master information system. (Example: the integration of data common to the payroll, personnel, and accounting functions.)"

3) "The integration of data processing systems, as permitted by security considerations, between agencies, or between private industry and the Government. (Example: the provision of air quality data on magnetic tape by State Governments to EPA.) Government efforts to achieve appropriate standardization of ADP equipment and techniques, including substantial support of the American Standards Association program in this field, give promise of alleviating some of the incompatibility problems which have impeded the exploitation of the potential benefits of data interchange in machine-sensible form."

The first item essentially refers to the same considerations as the comments on the output requirements of the CEPA system in Section 4.1. Thus, a satisfactory answer to the questions of whether CEPA will increase the sophistication of the analyses and/or will enable otherwise untreatable problems to be addressed becomes not only an interesting consideration, but a requirement to meet EPA policy objectives. The second item closely described the discussion in Section 4.2.3. on the integration of planning data into the air quality analysis. The question of whether a CEPA system would encourage this type of integration again becomes one of meeting EPA policy objectives.

Another requirement of EPA directives on ADP system acquisition is the demonstration that the potential users of the system are prepared to commit the resources to maintain and operate the system and are willing to make the adjustments necessary to insure its success. For the CEPA system this implies a demonstration that state and local air quality planning agencies will use CEPA and are willing to change their existing practices to accomodate it in air quality maintenance planning and/or other analysis procedures.

The remaining directives contained in Ref.17 apply to system design specification, system procurement, and standardization requirements. These will be addressed in Phase 2 and 3 of this study, if the decision to proceed is made.

In addition to the requirements of Ref. 17, several other system requirements have been reviewed. EPA has directed that, in accordance with GSA restrictions: 1) all new software packages must be programmed in a high level Federal Standard Language using only standard features, and 2) general purpose software packages (e.g., data base management) should be procured from independent firms with highest priority given to those packages that have demonstrated ease of adaptability to a variety of equipment configurations. It has been further recognized that EPA does not have a coordinated policy on the use of EPA data systems by outside agencies. Two approaches have been employed: the limiting of access to computer facilities to EPA offices, and the opening of access to most state government agencies with the costs being covered by either the EPA ADP budget or by directing some agency grant money into the ADP fund for this purpose.

Since CEPA is the type of system that would be expected to find widespread use by a number of agencies, its design must keep these two possible procedures in view. This may mean system design to minimize the potential demands on EPA computer facilities by outside users (e.g., design of a package that could be sent to an agency for its own installation).

### 4.4.2. Other Agency Data Processing Policy

The Office of Management and Budget (OMB) and General Services Administration also impose requirements on ADP systems.

OMB Circular A-109[18] outlines requirements for the acquisition of major systems designed to fulfill responsibility, or "mission need", of an agency. One of the principle policy objectives is to insure that a major system (in this case, CEPA) does in fact fulfill a clearly articulated mission need. The required output of an air quality maintenance analysis has already been described in Section 4.1; the need for a CEPA system to fulfill this requirement is determined by the Regional Office and agency interviews to be presented in Section 5. Thus the structure of the feasibility study complies with this requirement. The circular also requires that the appropriate scheduling of system acquisition be evaluated. This has been discussed in Section 4.3.

Most of the rest of the circular's requirements are not relevant to the current feasibility study or are more closely identified with what will be done in Phase 2 and 3 if they are implemented. Among these latter requirements, the most significant is the stipulation that mission needs must be identified independently of any existing system or technological solution and that ample opportunity be given to weighing the value of several alternatives. The Phase 2 work plan addresses this by first identifying the specific requirements of the emission projection and allocation scheme and then comparing several alternatives to meeting those requirements. In this sense, the Phase 2 effort complies with the circular's directives.

Bureau of the Budget Circular A-76[20] prescribes policies on the acquisition of commercial or industrial products and services for government use. The objective of the circular is to provide policy guidance on whether the Federal government should seek private industry to provide products and services or should provide these itself. The application to a CEPA system is indirect in that the CEPA system is not intended for Federal government use but rather for state and local agency use. The question is reduced to a decision if the Federal government should develop and supply a CEPA system to the states or if reliance should be placed on the states and/or their contractors to develop their own. Several criteria are given in the circular for determining that government activity is warranted. The three that are relevant to a CEPA system include: 1) a satisfactory commercial source is not available and cannot be developed in time to provide a product or service when it is needed, 2) the product or service is available from another Federal agency, and 3) procurement of the product or service from a commercial source will result in higher cost to the government. An evaluation of whether the first criteria is met is included in the discussion of the current state responses to the AQMA regulations. The quality of the analysis efforts without a CEPA system will be highlighted. The time schedule considerations have already been discussed. The second criteria will be addressed in Phase 2 when existing systems are evaluated. The third criteria will be discussed primarily in Phase 2 when a cost assessment of a CEPA system is made. A related discussion regarding the current method of conducting the analysis and its cost implications is presented later.

General Services Administration Federal Management Circular (FMC) 74-2 discusses a policy for the development of a management information system to track ADP use in government. The circular relates to CEPA system evaluation only to the extent that a CEPA system might increase EPA computer utilization and this would have to be reported as part of a regular financial statement of ADP use. The primary emphasis of the circular is on hardware inventorying.

### 4.4.3. Code of Federal Regulations Requirements

Title 41, Part 101-32 of the Code of Federal Regulations deals with Government-wide Automated Data Management Services. Subpart 32.203 outlines the criteria for a government agency acquiring ADP capability. The regulation requires that it must first be demonstrated that existing Federal ADP resources are not adequate to satisfy the need; then procurement procedures are outlined. For the CEPA system this demonstration will be handled primarily in Phase 2 when several existing systems are evaluated. Subpart 32.4 requires the specification of system performance independent of existing equipment. That this will be treated in Phase 2 has already been discussed. The section does, however, distinguish "desirable features" from "mandatory requirements" and requires that these be identified separately in any procurement document.

Subpart 32.13 specifies the use of Federal Information Processing Standards Publications (FIPS PUBS) as the standard reference for ADP hardware and software. These documents outline specific guidance on items such as character code used, magnetic and paper tape standards, flowchart standards, program documentation requirements, and others. All of these requirements can be built into a CEPA system specification. Standard terminology for use in procurement documents is given. One of the requirements that might have direct significance for a CEPA system is Subpart 32.1305-1, which specifies the use of COBOL in all "business-oriented computer applications (i.e., those applications or programs that emphasize the manipulation of characters, files, and input/output as contrasted with those concerned primarily with computation of numeric values)..." Although the CEPA system is not business-oriented in this sense, parts of it would require significant data set manipulation and input/output processing that might be difficult to handle with a scientific language such as FORTRAN. Although this subpart may not necessarily mandate the use of COBOL in this case, it does create an incentive to use it for the sake of general familiarity with the language on the part of Federal ADP users. This will be discussed again in the light of state and local agency requirements.

Subpart 32.16 describes the Federal Software Exchange Program, which is designed to serve as a cataloguing center of computer programs. The regulations require that agencies planning to acquire software first screen the existing programs on file in the Federal Software Exchange Catalog. This has not been incorporated into the current feasibility study and may provide some useful insight into computer programs available from other agencies that would be beneficial in CEPA system considerations.

## 4.5. SECURITY REQUIREMENTS

The Code of Federal Regulations (41 CFR Part 101-32.17) discusses security requirements for ADP systems. Although the focus of these regulations is on the protection of an individual's privacy, there are some implications for a CEPA system. The primary security problems result from the handling of industrial process information that could be confidential proprietary information and from the handling of industrial expansion planning data that might be confidential. Since this information involves point sources only, the security practices built into existing emission inventory procedures apply directly and should be adequate to safeguard proprietary data. Although expansion planning data has not traditionally been included in an emission inventory, the protection of confidential plans should be readily handled by existing procedures. It is also quite conceivable that expansion plans involving extreme security requirements will simply not be reported by industry until such time as permit requests are made.

# 5. POTENTIAL USER SURVEY

One of the principle objectives of this phase of the feasibility study was to identify the potential users of the system and to determine if a CEPA system would, in fact, be a useful tool for them. Because of the different perspectives of the various user groups, the comments of each will be discussed separately. The ten EPA Regional Offices, seven state air pollution control agencies, and two regional planning agencies were interviewed.

## 5.1. THE EPA REGIONAL OFFICE PERSPECTIVE

In recent years, the EPA Regional Offices have been assuming more responsibility in the development of air quality management programs for the states. The air quality maintenance planning program delegates a good deal of authority to the Regional Administrators to determine the needs and requirements of the maintenance plans within the framework of the basic regulations. For this reason, the viewpoints of the Regional Offices play a significant role in determining the need for a CEPA system to carry out the analysis.

All ten EPA Regional Offices were contacted by phone to insure that the opinions and viewpoints of all of the regions would be represented. In addition, three Regional Offices were visited to obtain more detailed information. Appendix A includes the telephone survey questionnaire used.

### 5.1.1. Current Effort Status

Table 5-1 presents a summary of the AQMA planning effort as compiled from the phone survey. It is immediately evident that most of the states involved in air quality maintenance planning have either completed or are well under way with the initial analysis. Nine states have either not begun or are substantially behind schedule according to the Regional Office evaluation. This further reinforces the conclusions of Section 4.3. in that the development of a CEPA system to assist in the AQMA analysis is substantially late.

Use of Contractors Another point is immediately apparent from the table. The vast majority of the states are using contractual assistance, either a regional planning agency or a private consultant, to handle the bulk

Table 5-1. Regional Office Summary of AQMA Planning Effort

| Status of Analysis[b] | Number of States Involved in AQMA Analysis Agency Performing Principle Effort[a] | | | |
|---|---|---|---|---|
| | State Agency | Regional Planning Agency | Private Consultant | TOTAL |
| Analysis Completed | 1 | 1 | 10 | 12 |
| Analysis Underway | 6 | 2 | 14 | 22 |
| Analysis Not Yet Started[c] | 2 | 4 | 3 | 9 |
| TOTAL | 9 | 7 | 27 | 43 |

[a] Indicates agency doing the bulk of the work although some involvement by others is included.

[b] Refers to initial analysis of attainment and maintenance problems.

[c] Includes states that were identified as being for behind schedule.

of the analysis. Only 9 states are planning to or have already done the majority of the work in-house. This is especially signficant in light of the fact that there have been some dissatisfactions expressed on the part of the Regional Office staffs and the state agency staffs with the quality of the contractual work being done. Two Regional Offices expressed the feeling that some contractor performance had been less than adequate and a third indicated that there is a strong preference to have the states do most of the work in-house rather than having contractors carry the majority of the effort. One Regional Office said it had been forced to be more detailed and specific on its contracts to insure adequate quality control. Two Regional Offices indicated that the regional planning agencies generally did a superior job to the private consultants.

At the same time, the only assistance that the Regional Offices have been providing to the AQMA analysis effort has been in the form of contracts to consultants to do some of the work. Five of the Regional Offices indicated that this was the major form of help they had given the states, four indicated that they had not provided very much assistance at all, and one indicated that the states had taken a very active role in conducting the analysis and little assistance or direction from the Regional Office was needed. In addition, five of the Regional Offices anticipate that they will have to do some of the AQMA analysis because of possible inadequacies in state submissions. Three of the Regional Offices indicated that they would use contractors to do the analysis rather than doing it in-house. The other two did not indicate how they would approach the problem. Only one Regional Office indicated that it would like to develop its own analysis capability; another indicated its ability to handle a part of the allocation procedures with existing in-house procedures.

It is evident that the bulk of the AQMA analysis has been carried by contractors rather than state agencies. Clearly, the time schedules and funding restrictions, both on the federal and state levels, have made this the only possible way to proceed. Many Regional Offices and states have expressed satisfaction with their contractors' efforts, but the incidence of inadequate performance is high enough to warrant some review of the regulatory procedures that make this mode of operation effectively mandatory rather than elective. There have been instances of a state being virtually unaware of the data and techniques used by a contractor; there are reports of a contractor not adding anything substantive to what a state agency supplies, yet charging for a full analysis; there have been instances of a contractor using an analysis technique without consideration of the reality of the results. It must be emphasized again that this is not intended to imply that the majority of contract work is inadequate. In fact, the opposite is probably true. Rather, it indicates that the situation needs to be studied to determine how the incidence of inadequate performance can be reduced.

The availability of a CEPA system can be viewed as a means of encouraging the development, in state and local air pollution control agencies, of in-house capability to do air quality analyses. The Regional Office survey indicated that this would be true in a number of states, but not across-the-board. Specifically, 29 states were identified as currently having the in-house expertise to handle a CEPA system, while 15 were identified as being unable to handle it; no evaluation was available on 11 states. Of the 15 currently unable to make use of the system, at least 5 would probably not be interested in developing the capability. It is evident from this information that the potential for the use of a CEPA system to decrease reliance on contractors exists in at least half of the states. The question of whether, in fact, the availability of such a system would encourage this trend cannot be answered by this information alone. Clearly some of the states, although the capability exists, would still prefer to use contractors. Only 6 of the 29 states were identified by the Regional Offices as being definite candidates interested in expanding their own in-house capability; 1 other was a clear candidate not to use CEPA because it had already developed its own system. No evaluation was made on the remaining states. One Regional Office indicated that other incentives to develop in-house capability would be stronger than CEPA availability. The availability of emission inventory and air quality data processing capability were cited as examples.

Problem Tasks The Regional Offices were asked to identify which tasks in the AQMA analysis were creating the most difficulty for the states. One of the most recurring problems was that of the quality of the emission inventory data. Several Regional Offices reported that the emission inventories were in very poor shape and a significant amount of effort was being spent on improving them. Although the point source data represented a significant problem by the nature of its volume, the area source information appears to be creating a bigger difficulty. A large number of data sources must be contacted and very often the information is contradictory or inconsistent. Quality control of the data handling was another problem area. One Regional Office reported problems with data management where individual pieces of information were expressed in terms of powers of 10 (e.g., $10^2$, $10^3$, etc.). This format led to many errors on the part of data processing staff.

A CEPA system will not be able to directly improve the quality of the inventory data. It can be viewed as providing a standardized format for data collection and allowing the user to more easily cross check information but will not alleviate the need for substantial emission inventory efforts. One Regional Office indicated the need to determine the level of accuracy of the analysis. A CEPA system could help by providing the ability to do a sensitivity analysis of the various parameters assumed.

Another problem that was mentioned in two Regional Offices is that of gridding and mapping various areas on to a grid system. The states are apparently using many different areal representations (e.g., census tracts, regional planning districts, municipal jurisdictions, etc.) and are still having some difficulties with mapping this information onto a grid system for modeling purposes. One Regional Office indicated that the Engineering Science model[22] seems to handle this. The use of the CAASE program[8] to assist in this task, however, has not met with uniform success. Three Regional Offices reported the use of CAASE. One region indicated that the CAASE program was difficult to use and the 5-step process made it cumbersome. They also indicated that if a CEPA system was designed to be as complex as CAASE that the states would probably avoid it and rely on contractors instead. Two of the regions indicated that there were substantial problems with the use of the allocation parameters in CAASE. One stated that they had begun to require that any activity allocated to a grid cell by CAASE must be accompanied by a prior knowledge that the activity does, in fact, occur in that cell (i.e., reliance on the allocation parameter alone was inadequate). The other stated that there were some significant problems with using the subjective allocation parameter option in CAASE. One Regional Office indicated that they did not advocate the use of CAASE in their region (likewise, they did not advocate the LANTRAN routine in AQUIP) and that they were "stuck with it" in one area. Another region indicated that they had decided against the use of CAASE since they had been advised that it was too difficult and expensive to operate. They also indicated problems with accepting the allocation parameters mechanically. These considerations lay some significant foundations for the consideration of a CEPA system. A complex approach that is not easily implemented will be avoided by the states.

Another problem area that was mentioned in four Regional Offices was that of dispersion modeling. Particular difficulties were in short term modeling, complex terrain, and fugitive dust. A CEPA system would not help this situation except that it would allow the user to try a variety of models without having to expend a great deal of effort on adjusting the input data to the variety of model formats.

Additional problem areas referenced included the need for socioeconomic evaluation techniques and the need for good meteorological data.

State-developed Systems The Regional Offices were asked if any of the states had computerized portions of the analysis procedures. Four indicated that this had not been done and that the emission projections and allocations were being done manually. Three indicated that some parts of it had been computerized by contractors to suit specific needs and another indicated that a highway department package was being used. Two others stated that one state in their respective regions had developed relatively extensive computer-based growth projection programs that pre-dated the AQMA requirements and are using these in their analyses. In one case it was reported that the availability of the large data handling capability had been crucial to the incorporation of input from a wide variety of decision making groups. The computer requirements in this instance were, however, extremely large. Two states were reported as using metropolitan planning organization and/or land use models to project growth.

### 5.1.2. Regional Office Analysis Evaluation

The Regional Offices were asked if the availability of a CEPA system would make review of the AQMA analyses and plans easier. Seven regions indicated that it would (with varying levels of usefulness), one indicated it would not, and two had no opinion. One point that did surface in this part of discussion is that there are virtually no formal arrangements that have been finalized on how exactly the plan review process will take place. Two regions indicated that they will treat the review on a case-by-case basis; one region stated that they do not plan to go through the analysis in detail; three regions reported that they are attempting to work closely with the states to avoid inadequate analyses.

It has already been mentioned that five of the Regional Offices anticipated having to do some or all of the analysis in certain areas. This, combined with the fact that a plan review process has not yet been determined, may indicate that a CEPA system could prove useful in the Regional Offices as well as in the states. It has already been stated, however, that only one Regional Office expressed a desire to develop its own capability in this area.

The Regional Offices were also asked if they had imposed any special requirements or permitted any relaxations of the analysis techniques outlined in Refs. 7 and 13. Two regions had modified the dispersion modeling requirements somewhat, one had pressed for a higher level of detail, and another had required a short term particulate and $SO_2$ analysis. None of these would have a major impact on a CEPA system.

### 5.1.3. CEPA System Timing

The Regional Offices were asked to comment on the timing of CEPA system development. Four regions indicated that the system might find some use even if it were available late in the analysis period (e.g., mid 1977) but that it would be only in limited circumstances. For example, one state had requested a delay in the analysis submission date and several other states were evaluated by the Regional Office as being in an "idling" mode pending the outcome of the elections. Two other Regional Offices suggested that the system would be of value only if it were available immediately, and two others indicated that it would only be of value in the 5-year update analysis.

These comments, combined with the previous discussions in Sections 4.3. and 5.1.1. emphasize the critical flaw with CEPA system development. It is too late to be of much help in this portion of the AQMA analysis sequence. As the following discussions will show, the potential for successfully developing and introducing the system for widespread use would have been much higher if it had been prepared at the beginning of the planning process.

Two significant suggestions were made by Regional Offices. One was that parts of the system be introduced early to make them of some value to the current efforts. This would be difficult to accomplish since this feasibility study (Phases 2 and 3) are not scheduled for completion before mid 1977. A decision to proceed with all or part of the CEPA system would be needed before the completion of the work effort.

The second significant suggestion was that a strategy to implement a CEPA system be developed prior to its actual introduction. Such a strategy might be its introduction in a part of a state first, with further expansion later. This would help ease the transition process and would keep the states from deciding a priori that it was too big and complex to handle.

One potential problem area was noted. Several Regional Offices indicated that the introduction of a CEPA system at this point in time might give some states an excuse to seek delays in submission of AQMA analyses and plans. A suggestion was made that if a CEPA system is built that it not be made available until after the initial round of analyses had been completed.

### 5.1.4. System Design Features

Several Regional Offices offered some suggestions on the type of system and the design features that would be most useable. Three Regional Offices emphasized the need to relate the CEPA system to regional planning data by providing the appropriate data handling interfaces. One suggested the development of standardized format for the data; another suggested that the development of pre-processing modules that could be modified by the user to handle varying data formats would be the most useful. This pre-processing could be handled by a data base management system (e.g., MARK IV or System 2000) with some editing and sort routines available to the user. In either case, there were clear indications that the ability of a CEPA system to process other sets of information is a critical design parameter.

The types of data sets that need to be considered in addition to regional planning data include information from the Census Bureau, Department of Housing and Urban Development, Department of Transportation, Urban Mass Transit Admisistration, and others. One Regional Office suggested that this interface would enable an air quality evaluation of other planning programs to be made above and beyond the specific requirements of the AQMA effort. Another indicated that the CEPA system could be used to force the issue of the use of compatable data bases by the various planning groups. The specific requirements of interagency cooperation in the AQMA analysis regulations reemphasizes these points.

In terms of CEPA system structure, there was a division of opinion on the part of the Regional Offices. Some suggested that a set of modular packages be developed that would enable the user to select the piece(s) of most interest and ignore the rest. This was further emphasized by the need to retain system flexibility to adapt to varying situations. Another suggested that, based on the experience of the cumbersome 5-step process involved in using CAASE, the use of several steps is prone to error and that an integrated package would be most helpful. It was acknowledged, however, that a large and complex system does offer the user the possibility of not critically evaluating the data and appropriateness of the techniques and ending up with a meaningless set of numbers that are given credance simply because they were generated by a sophisticated computer program.

A computerized set of standard emission factors was suggested as a useful tool for users. These could be used as default values in the absence of actual emission data. The availability of default values for other parameters was also suggested as a beneficial feature. Suggestions were also made that the system allow for varying levels of analysis, provide varying outputs for different dispersion models, allow for cross-check and trade-off evaluations, provide a strategy evaluation package, and permit separation of the data by political jurisdiction.

Computer system hardware and software constraints on a CEPA system were expressed by several Regional Offices. One region alone indicated that the states had CDC, IBM, PDP, and UNIVAC equipment thus indicating the need for a program that was readily adaptable to a wide variety of hardware. Many state air pollution control agencies were sharing their equipment with other state agencies and had some problems getting run time priority. This would seem to indicate that a large, time-consuming system might create some turnaround problems for states using it. It was suggested that the CEPA system be available on a large centralized computer facility (e.g., EPA's) for use by states with computer access problems but that it also be available for installation on other systems. Disk and tape drive constraints were mentioned as a possible problem. For programming languages, FORTRAN was a universal recommendation for use with the calculational parts of the system. For the data management aspects, COBOL was recommended most often although some agencies might have only limited experience with it. (The Federal requirement of COBOL use for business and management programs has already been mentioned in Section 4.4.3.). Doubts were expressed as to the usefulness of PL1 programs.

Some miscellaneous suggestions were also included such as the segregation of Set I and Set II pollutants in the system and the combination of point source allocations into CAASE.

### 5.1.5. General Comments on System Need

The Regional Offices were asked to provide general comments on the need for a CEPA system and were then asked if they would encourage its use in their region. One Regional Office indicated that there was potential for system use in the region and that they would encourage its use. Three regions indicated that the primary utility would be in the five year update and that the system would not be of much use in the current round of analyses. Two of the three indicated that they would encourage its use but not across the board. States that were behind schedule, had ill-defined problems, or that had weak analyses would be prime candidates. States that had already developed an analytical approach would not be asked to change direction. Likewise, the system would not be encouraged in states where it would be likely to create requests for delay and postponement of analysis submittal dates.

One Regional Office indicated they would recommend it for use if some of the bugs in the Ref. 7 and 13 procedures were ironed out, another said they would recommend it as a means of reducing the tedious work load, and another said they would recommend it primarily as a tool for emission inventory update.

One Regional Office indicated that they were neutral to the idea. CEPA would be another general analytical tool and would probably be used if it were available. One Regional Office felt it was unnecessary since most of the tasks could be done manually but the system could be viewed as a supplementary aid and might have some future utility.

The need for adequate training to assist the states in using the system was also mentioned.

### 5.1.6. Summary

To sum up the Regional Office perspective on the need for a CEPA system, the comment of one representative appears especially appropriate: "The package would be good, but I'm not sure exactly how it would be used. There would be times when we could really use such a program." Only one representative indicated that the CEPA system was not necessary. The general feeling of the others was that it would have been beneficial 1-2 years ago and that its utility at this point in time must be viewed from long-range considerations. The principle advantages of the system would be the ability to interface with other planning data, the encouragement of in-house analysis capability, and the upgrading of the quality of the analysis. The principle disadvantages would be the poor timing of system introduction, the tendency to rely on computer-generated data, and the possible transformation of a relatively straight-forward manual task into an exceedingly complex automated task. One of the principle considerations that appeared in many places was the quality of the data used by a CEPA system. More difficulty was encountered with the data than with the actual projection and allocation techniques. A CEPA system that could ease some of the data collection and evaluation burden and would promote the development of better emission information would be a significant bonus.

## 5.2. THE STATE AGENCY PERSPECTIVE

Representatives of seven state air pollution control agencies were interviewed to determine their perception of the need for a CEPA system. Since the questions were more detailed than those used for the Regional Office discussions, a separate questionnaire was developed; this is included in Appendix A. Since the agencies interviewed represented a wide range of capabilities, experience, and resources it can reasonably be expected that the comments will give a relatively accurate picture of the need for a CEPA system from the state agency viewpoint.

### 5.2.1. Current Effort Status

The seven states interviewed among them had 33 AQMAs designated. All but 2 were designated for particulates, 14 were designated for $SO_2$, 2 for CO, and 10 for oxidants. In 21 of the AQMAs the analysis for maintenance had been completed and work was beginning on the development of the AQMA plan. Two of the AQMAs had the analysis well underway and 10 had the analysis either in very early stages or not yet begun.

The extent of the analyses varied as did the type and special problems of the AQMAs. Most of the analyses had been done following the guidance of Refs. 1-13. There were, however, some variations that have some implications for a CEPA system. One state, in reviewing the guidance of Refs. 7 and 13 decided not to go into the details of emission projection and allocation because of the complexity of the analysis. Review of the problem indicated that a New Source Review (NSR) procedure might be adequate to resolve the maintenance problem. Two states indicated that several of their AQMA problems were dominated by one or a few large sources and NSPS coupled with a NSR procedure would be adequate to maintain the standards.

In these cases the analysis was relatively simple and required only minimal calculational effort. At the other extreme two states reported extensive calculations, one having analyzed the entire state and the other using a basic data set on a 1/4 square mile resolution. This indicates that any type of CEPA system must be able to deal with the easy problems as well as the more complex or it will be useful only in the large metropolitan areas with large data requirements.

Two states indicated that growth projections were especially tenuous because decisions, outside of their control, could make a dramatic impact on the type and extent of growth they could expect. These decisions included government policy directives on the development of western energy resources and the world market for copper. One state indicated that one of the principal benefits that could be derived from the availability of a CEPA system would be the ability to analyze a variety of development scenarios instead of having to choose just one as was the current practice.

Four of the states reported problems with fugitive dust and the development of adequate techniques to evaluate the causes and determine appropriate controls. One state indicated that the nature of the fugitive sources made projections extremely difficult. They also indicated that they have very few ideas on how to develop and implement a control strategy. Modeling of complex terrain was another problem area often raised.

All of the states had been interacting with regional and local planning groups. The level of involvement varied primarily with the experience and activity of the planning agency. One state indicated that planning was a relatively new concept in the state as a whole while another was able to assemble a good deal of the information it needed in the appropriate format from the planning agency. One state reported that the use of the CAASE program for AQMA analysis had prompted the state highway department to shift to a machine-readable, UTM-coordinate system for the sake of compatability.

### 5.2.2. Agency Resources Available

The states were asked about the in-house, contractor, computer personnel, and computer hardware resources they had available.

In-house staff Table 5-2 indicates the level of manpower that each state had committed to the AQMA analysis. There appears to be almost a uniform level of 2 man-years for each state. The state with 4 man-years committed is not the largest in terms of number of AQMAs and extent of problems; the state with 1 man-year is the smallest of the seven in terms of maintenance problems.

These figures do not represent agency activities such as emission inventory, monitoring support, and clerical and management support. A typical profile of the agency AQMP personnel would be two senior engineers (a senior engineer and a junior engineer in smaller agencies) organizationally located in a strategy/regulation development position.

It is evident from this information that the level of resource commitment is relatively low. Legislative restrictions on agency size and budget, competing tasks placing demands on agency staff time, and the ready availability of outside contract assistance with Federal EPA funding are among the reasons for this phenomenon. In terms of CEPA system requirements there are indications that if it were designed to support the AQMA analysis only, there would be substantial restrictions on the resources available to maintain and operate the system. Several criteria for system utility would be that: 1) it must enable this typical 2-person staff to function more efficiently in conducting the AQMA analysis, 2) it must be simple enough to enable it to be used without increasing agency resources, and 3) it must have utility for other agency functions if it requires more resources to be committed to it.

Contractor Utilization Table 5-3 shows the extent of contractor utilization among the states. All had used contractors to some extent although in 2 states the use had been minimal. Four states were interested in either building or maintaining their in-house capability with one state specifically rejecting contractor funding. In general, the perspective that was prevelant at the Regional Offices was upheld from the states' viewpoint: i.e., the states would like to have more in-house capability, the use of contractors was almost mandatory to meet the analysis requirements and time schedules dictated by the regulations, and there was a higher than would be desired incidence of dissatisfaction with contractor performance.

Table 5.2. State Agency Resources Committed to AQMA Analysis

| State | Resources Committed<br>FY 76<br>(man-years) | <br><br>(1000$) | <br>FY 77<br>(man-years) | <br><br>(1000$) |
|---|---|---|---|---|
| 1 | 2.50 | 50 | Decreasing | NA |
| 2 | 2 | NA | NA | NA |
| 3 | 4 | NA | NA | NA |
| 4 | 1 | NA | Increasing | NA |
| 5 | 1.91 | 40 | Decreasing | NA |
| 6 | NA | NA | NA | NA |
| 7 | 2 | 62 | 2.3 | 75 |

Table 5-3. State Agency Use of Contractors

| State | Contractor-Performed Tasks | State Policy on Contractor Use |
|---|---|---|
| 1 | Area source information | Prefer to do as much in-house as possible. |
| 2 | Most of the analysis | Have used regional planning agencies. |
| 3 | Growth projections, point and area source allocations | Parts of analysis were redone in-house. |
| 4 | Allocations using CAASE | |
| 5 | Projections and allocations in all but easiest AQMA | Are building more in-house capability. |
| 6 | Very little | Undecided regarding extent of contractual assistance. |
| 7 | Very little | Have turned down contractual assistance funding in order to maintain in-house capability. |

The implications of this pattern for a CEPA system are not entirely obvious. From one perspective, the development of a CEPA system can be viewed as providing a tool to the state agencies that will enable them to perform more of the analysis in-house and reduce their reliance on external sources. From another viewpoint, the CEPA system could become so complex and difficult to operate that the states would be forced into even heavier reliance on contractual assistance to maintain it and extract the maximum potential from it. From yet a third viewpoint, it may not be desireable to minimize the use of contractors since many states are satisfied with their performance and the procedure does have the advantage of providing the states with skilled personnel that need not become permanent staff. One thing is evident from this situation: that a policy decision on the extent to which in-house capability will be emphasized over contractual assistance will play an important role in determining the need for and the design of a CEPA system.

Computer Personnel Available Table 5-4 gives the states' availability of computer personnel. The groups are separated into computer programmers, whose principle function is to develop and operate computer codes, and knowledgeable staff who are primarily technically trained (e.g., engineers) but who know how to program.

Many of the states have access to large state computer facilities and programming staffs although only in the larger agencies are programmers specifically assigned to the air pollution control agency. Computer programming is most frequently handled by the technical staff (engineers, meteorologists, etc.) who have the immediate need. In the air quality maintenance analysis effort, the programming, including the use of some of the available routines such as CAASE, were almost always handled by a member of the technical staff familiar with the AQMA procedure rather than a trained programmer. The complexity of the computer routines was limited by the extent of the familiarity of the staff with FORTRAN and/or COBOL. Two states did have technical staff who were especially competent in computer use but other demands on their time kept them from functioning purely in a computer support role.

From the viewpoint of CEPA system development it must be recognized that the eventual user will not be a highly specialized computer programmer

Table 5-4. Availability of Computer Personnel

| State | Number of People | | Agency Feels Staff is Adequate |
|---|---|---|---|
| | Programmers[a] | Knowledgeable Staff | |
| 1 | 1 | 2 | Yes |
| 2 | 4 | NA | Yes |
| 3 | | 6 | Yes |
| 4 | | 3 | Yes |
| 5 | | 2 | Yes |
| 6 | 12 | 7 | Yes |
| 7 | 2 | 3 | Yes |

[a] Includes programmers available to the air pollution control agency from state computer personnel pool.

but rather an engineer or meteorologist who knows some programming. This is significant in that programming techniques that involve intricate manipulations of data or involve subtle program steps are likely to be confusing to the average user unless very clearly documented. In the worst circumstances, the CEPA system could become completely unuseable because it is too sophisticated. To counteract this possibility, it may be necessary to sacrifice some machine efficiency to develop a code that is more readily understandable and changeable by the average user. Documentation requirements also become more important in the light of this user profile.

The states were also asked to assess their own capability to operate and maintain a sophisticated computer package like a CEPA system might be. Without exception they replied in the affirmative although some indicated that they might need some assistance in getting the codes mounted on their equipment. In general, an agency experienced in the use of the various computerized dispersion models (AQDM, CDM, etc.) would probably not have an exceptional amount of difficulty operating a well-designed CEPA system.

Computer Hardware and Software Availability Table 5-5 indicates the extent of computer hardware and software capability available to the states. There is a wide variation in the machine type with four states

Table 5-5. Computer Hardware and Software Availability

| State | Machine | Core Size (1000 words) | Availability | Input Capability | Languages Available | | |
|---|---|---|---|---|---|---|---|
| | | | | | FORTRAN | COBOL | Other |
| 1 | UNIVAC 1110 | 600+ | State facility, shared | Interactive and Batch | Yes | Some | Some BASIC<br>Some Assembly Language |
| 2 | UNIVAC 1108 | 650 | State facility, shared | Interactive and Batch | Yes | No | BASIC |
| 3 | SYBER 72<br>PDP 11 | 98<br>32 | State facility, shared<br>In-house | Interactive and Batch | Yes | Yes | Some BASIC |
| 4 | CDC 3300 | 131 | University | Primarily Batch | Yes | Yes | Some BASIC |
| 5 | IBM 370 | NA | State facility, shared | Batch | Yes | Some | PL1 |
| 6 | DEC<br>2-UNIVAC 1106 | 64<br>262 each | In-house<br>State facility, shared | Interactive and Batch | Yes | Yes | Assembly Language |
| 7 | UNIVAC 1108<br>IBM 360<br>Data General | NA<br>NA<br>NA | University<br>State facility, shared<br>In-house | Primarily Batch | Yes | Yes | Some PL1<br>Some APL |

having UNIVAC equipment, two having IBM, one each having CDC, PDP, SYBER, DEC, and Data General. Three of the states have more than one type of equipment. Machine core size varies but the information presented only partially reflects actual machine capacity. Word size is another significant parameter but this information was not available. In general the availability of the large machines, at least on a shared basis, presents no constraints on CEPA system utilization.

All of the states are sharing at least a part of their computer facilities with other state agencies or are contracting for the use of a university computer. Only three of the states have access to small, in-house equipment that is used primarily to handle smaller programs and routine data processing. These facilities may be generally too small for a CEPA system.

Four of the states used both interactive and batch processing of jobs on their equipment. Two others used primarily batch although some interactive processing was done. One state used only batch. This indicates that the CEPA system should probably not rely too heavily on interactive processing. This was further reinforced by later discussions where the states indicated that interactive connection time was too expensive for general use.

All of the states had FORTRAN available. All but one had COBOL available although two indicated that it was not used very much. The other languages, BASIC, PLI, APL, and Assembly were only occasionally available. This is a strong incentive for CEPA to be confined to FORTRAN or COBOL. Even at that, some states recommended that FORTRAN-COBOL programs be avoided because of difficulties in using a combined language program.

Table 5-6 presents typical dispersion model run costs. The basic computer charges are difficult to compare because of the varying accounting systems used at different computer installations. Costs for a dispersion model run are nominally in the hundred dollar range although there have been some reports as high as $1000 per run. It is evident that this rate can cause computer charges to mount very rapidly. A CEPA system cannot be designed in such a way as to create large increases in computer time requirements. Two states reported computer budgets for AQMA analyses of $10,000. Considering the costs of the dispersion model run itself, there is not a great deal of room for creating large space- and time-consuming

Table 5-6. Typical Computer Costs

| State | Basic Computer Charge | Dispersion Model Parameters | | | |
|---|---|---|---|---|---|
| | | Sources | Receptors | Cost | Turnaround |
| 1 | $8 per core block hour | 90 | 225 | $90 | NA |
| 2 | NA | 470 | 80 | $300 | NA |
| 3 | $50 per cpu hour on state machine<br>$550 per cpu hour on contractor machine | 2000 | 60 | $1000 | Daily |
| 4 | $1.50 per minute | 1700 | 125 | $100 | Overnight |
| 5 | NA | NA | NA | NA | NA |
| 6 | NA | 500 | 2500 | NA | 4 hours |
| 7 | NA | 120 | 250 | $100-day<br>$50-night | Overnight |

programs. A CEPA system might conceivably be used to minimize computer requirements by allowing the analyst to review the impact of a large number of strategies on emissions (with a detailed spatial and/or temporal resolution) prior to the testing of the strategy on the dispersion model. To be used in this manner, the CEPA system would have to have significantly lower resource requirements than the dispersion model.

### 5.2.3. Agency Experience

The states were asked to relate some of their experience in AQMA analysis.

Computerized Models The states were questioned on their experience with computerized dispersion models and computerized emission projection techniques. It has already been implied that a CEPA system, as envisioned here, would be analogous to a dispersion model in terms of complexity and ease of use. An agency's experience with the dispersion models would be indicative of how successful a CEPA system would be. Table 5-7 indicates agency experience with both dispersion models and with the CAASE program.

Table 5-7. Agency Experience with Computerized Models

| | Dispersion Models Used | | | | | Emission Projection and Allocation Models Used | |
|---|---|---|---|---|---|---|---|
| State | AQDM/CDM[a] | HIWAY | PTMAX | PTMTP | Other | None | CAASE |
| 1 | X | X | X | | | | X |
| 2 | X | X | | | | X | |
| 3 | X | | | | | X | |
| 4 | X | X | | X | | | X |
| 5 | X | X | | | APRAC | X | |
| 6 | X | X | | | | X | |
| 7 | X | | X | X | Valley,<br>C9M3D,<br>PTDP | | X |

[a] Includes use of the TDM and TCM models.

All of the agencies have experience with the multi-source urban diffusion models such as AQDM and CDM. Some have fairly extensive experience with point source, line source, and complex terrain models in addition. The problems with the models that were reported were application oriented; that is, the biggest issue was the validity of the model when applied to the local situation. The most frequently occurring problem was the difficulty in modeling in complex terrain. One state did indicate some computer problems in using a model from EPA's UNAMAP file. About two months of effort were expended on getting a UNAMAP model operational on the agency's computer. The compatability of the FORTRAN level used in the model with the system's compiler was the primary problem. Another state had some difficulties with the HIWAY model and indicated, "It never has worked properly." The restrictive assumptions required in HIWAY was another reason cited for the state's abandoning it. Most of the evidence indicates, however, that from an operational standpoint, the use of computerized dispersion models does not appear to be presenting significant problems for the states.

The states' experience with the CAASE program was not as positive however. One state started to use CAASE but were advised by their EPA-supplied contractor that it would not work properly and so did not proceed further. They also reported asking EPA for information about the AQUIP program but never received a response. Another state reported that they had their contractor use CAASE but that the type of information that was required was not available and was prohibitively expensive to obtain. The resolution of the growth data was the biggest problem and there was an indication that some operational difficulties between the contractor and the agency led to some confusion about the delegation of responsibility of data collection. The inaccuracy of the CAASE techniques of allocation by population was another problem. They were, however, considering getting CAASE operational on their computer. A third state indicated that some of the local planning agencies had looked at the possibility of using CAASE but they were not aware of the results of the experience.

It is evident from these discussions that the CAASE program is presenting more problems in its implementation than are the dispersion models. In one respect this should be expected since CAASE is much more complex from an operational standpoint; it involves the processing of tapes generated external to the air pollution control agency, it requires some manual interaction in developing grid squares, and it is a 5-step program rather than a single "black box". It is evident that a CEPA system will, of necessity, have to be easier to implement than CAASE if it is to be widely used.

Manual Analysis Techniques Since much of the emission projection and allocation was done by hand, the states were asked to identify the areas that presented the biggest problems.

One state indicated that they had almost entirely avoided the projections and allocations as outlined in Refs. 7 and 13. They felt that the resources were not available to follow these procedures and that the procedures themselves were unrealistic. They spent most of their effort on collecting area source data and are planning to rely on a New Source Review procedure to control growth. Four states indicated that the collection of good data was the biggest problem in the entire analysis. Problems with completeness of the emission inventory (especially area source information), compatibility of data (e.g., same year of information), consistency of data (e.g., one source contradicting another), validity of growth projections, and the use of federal and statewide guidelines and information that do not apply to local situations, were cited as problem areas. One state indicated that the manual methods were inadequate to treat their problems while another indicated that computerized methods would be unnecessary in all but one of their study areas.

One point was consistent through most of the interviews: the collection of good emission inventory and growth data is presenting a significant problem to the air quality analyses. If a CEPA system could provide a mechanism for alleviating some of these problems it would undoubtedly be widely implemented. It has already been discussed from the Regional Office perspective that the system could not eliminate the need for significant data collection efforts, but the ways in which it could play a role would be to allow the states to handle more information, which could then be more easily cross-checked for validity, to provide a standarized format for assembling the information; to, as one Regional Office suggested, "force the issue" of using compatable data bases onto the participating agencies; and to permit the analysts to evaluate alternative scenarios and to identify the sensitivity of the analysis results to key pieces of information. If the decision is made to proceed with CEPA system development, these considerations should be evaluated as potential design objectives.

Data Bases Available. The data bases of principle concern to the air quality analysis are the emission inventory and the planning data from regional, state, and local agencies. Table 5-8 indicates the type of emission inventory systems being used. Three of the states rely on the NEDS as the primary inventory tool although two are in the process of developing their own in-house computerized systems. The NEDS point source format appears to be widely accepted although some states have indicated they would like some additional information incorporated (e.g., other than annual emissions, employment, facility land area, etc.). One state, however, commented that the NEDS area source data are based on counties and that gridding and apportioning are necessary before use in air quality models. This is true but it should be noted that the CAASE gridding program and Volume 13 of the AQM Guidelines are provided by EPA specifically for such purposes.

During the interviews, three states reported delays of six months to two years in acquiring NEDS data printouts. Investigation by EPA subsequent to the Argonne interview revealed that such delays existed two to three years ago but have since been substantially reduced due to system and computer improvements. For

Table 5-8. Data Base Availability

| State | Emission Inventory |  | Other Data Bases |  |  |
|---|---|---|---|---|---|
|  | NEDS | In-house System | Data | Source | Computerized |
| 1 | Submit updates only | Computerized, NEDS format | Census tract data<br>VMT | Census Bureau<br>Highway Dept | Yes<br>Yes |
| 2 | Submit updates only | Computerized | Population, employment, VMT | Planning Agency | NA |
| 3 | Submit updates only | Computerized | Land use maps, population, employment | Planning Agency | Yes |
| 4 | Submit updates only | Computerized, NEDS format, EIS/P&R | Population, SIC employment, housing starts by political jurisdiction. VMT | Planning Agency | No |
| 5 | Used as basic inventory | Computerized system under development with NEDS format, EIS/P&R | Energy studies<br>VMT by link | Contractors<br>FHWA | No<br>Yes |
| 6 | Used as basic inventory | Computerized system under development with NEDS format, EIS/P&R | NA | NA | NA |
| 7 | Used as basic inventory | Manual | Population, some employment by county, voting district | 208 Agency | No |

example, in early 1976 one state experienced a seven-month delay in acquiring NEDS data whereas more recently, processing time had been reduced to two months.

Four states indicated that they had made use of some of the NEDS peripheral routines to process emission inventory data. Three of the four either had installed or are in the process of installing the Emission Inventory/Permits and Registration Subsystem (EIS/P&R) for use with their own inventories. This raises a significant observation that reflects on the possible use of a CEPA system. Most of the states are, in general, satisfied with the NEDS system structure and with the various routines available to manipulate the data. This satisfaction is indicated by the widespread use of these routines on in-house systems. The dissatisfaction arises whenever data must be in the centralized NEDS system before the States can access the data. This situation is being corrected by EPA via the installation of the EIS/P&R system in numerous state and local agencies. In this manner, the states can utilized their own data immediately upon collection and easily fulfill their reporting requirements to EPA. Also, one state complained that EPA had not provided adequate assistance on the use of the system; the state was not fully aware of all its capabilities and of how to resolve problems with the system. The responsible Regional Office has subsequently been advised of this problem and will send the appropriate references. There is a clear indication that a complete computerized package (like NEDS and like CEPA) can be designed to be of significant value to the states, but the need for adequate instruction and training in the use of the system is imperative.

As an aside to this discussion, it is also evident that a CEPA system design should strive for consistency with existing emission inventory data processing routines. This is especially true for the EIS/P&R system which is being installed in a number of states. One state felt the system would provide all the necessary point source data needed for AQMA planning and they are redesigning their inventory forms for use with the system.

Table 5-8 also indicates other data bases used by the states. This is not a comprehensive list for each state but does indicate the most prevalant forms of information available. One state indicated that it had access to a great deal of information but did not use it because the agency lacked the data handling facilities. Another reported that they had interacted with the regional planning agency and were using their data management routines to process the information. Manual methods were interspersed with computerized methods to generate emission estimates. Two states indicated that the information they had received from the planning agency was not in machine-readable form; one handled part of it by computer, the other felt that the amount of information was small enough that there was not need to computerize it. These perspectives reinforce earlier conclusions that the data input to AQMA analyses vary considerably and a CEPA system must be flexible enough to interface with a wide variety of formats, spatial and temporal resolutions, and levels of detail.

### 5.2.4. CEPA System Design

The states were asked to comment on any specific design features of a CEPA system that would be most useful. Three specific examples were cited in the question: a strategy package to apply various control strategies to the emission inventory, a computerized compilation of emission factors for use with the inventory, and a cross-checking feature that would tabulate data from different sources and check for consistency. Five states felt that the strategy package would be useful; one felt that this type of feature could be handled with the EIS/P&R system and one had no comment on it. In addition, two states indicated that the strategy package would be useful if it could be used to determine the consequences of a wide range of strategies and that flexibility was a key issue. Another state felt that the primary utility would be in area source strategies since there were not a great many point source problems that could not be handled manually. Three states indicated that the computerized emission factor file, with possible override capability was a good feature. Two states already had computerized emission factor files and the remaining two had no comment. Two states felt the cross-checking feature was useful, one felt it wasn't necessary, and the remainder had no comment.

In addition to these suggested features, some of the states offered their own comments. Three states indicated that a growth package would be especially helpful. Two forms of this were suggested. One would accept growth information from local sources and apply growth factors to the emission inventory to project emissions. Another would actually generate the growth factors from input historical data. The second version is much more involved and actually represents a growth algorithim. It was also suggested that the Federal government assume the responsibility for generating the growth scenarios. For both cases, the ability to handle several growth scenarios was suggested as a useful option.

The ability to interface with a variety of local data sources was identified as an important feature by three states. One state suggested that a graphics module, a statistical analysis package, a report writer, and an output feature that would provide information in a format directly compatable to dispersion models. Another state suggested that the system allow for varying levels of detail in the analysis.

With regard to the preference for an integrated CEPA system or a set of modular units, five states indicated that the modular approach would be the most desirable because of the flexibility it gives. One state prefered an integrated package but also emphasized the need for flexibility. One state had no opinion.

The question of a system that could be mounted on in-house computers vs. a centrally located system drew some differing responses. Four states indicated a preference for an in-house system primarily because of past problems with access to EPA computer facilities. Two of these states felt very strongly about this issue. Two states preferred the centrally located system and preferred to have EPA maintain and operate it. One felt there would be no use in keeping the system in-house if it were to be used only infrequently. One state suggested that the system be designed for in-house use but also be available on EPA facilities for those states needing it.

The computer language preferred was FORTRAN with four states indicating that COBOL was also a useful language. PL1 was suggested in two states and one indicated that APL had been successfully used. One state specifically emphasized the use of the programming principles in the EIS/P&R routines.

Six of the states suggested that batch processing would be preferable; one had no comment. Three states indicated that a combination of batch and interactive processing might be helpful. One state observed that the instantaneous turnaround associated with some interactive packages was not necessary and not worth the higher cost. Another state indicated that it has experienced difficulties in gaining access to an interactive terminal.

### 5.2.5. Potential for Agency Use

The states were asked for their general comments on the need for a CEPA system, its timing, and its potential application to other air quality problems. Table 5-9 summarizes these comments. Only one state felt that the CEPA system concept was not a very useful one; all others believed that it did have merit. Without exception, however, all felt that the system is too late to be of major usefulness to the current round of air quality analysis. The states that suggested an availability date quoted a time in early or mid 1977, which is much too soon to have a CEPA system operational. The utility of a later-developed system to the 1978 analyses for areas needing land use and/or transportation controls was also indicated as marginal because of the inertia of current programs that have adapted to other manual and partially computerized techniques. There was some indication from several states that if pieces of the CEPA system were available at an early date then they would be used to assist some of the on-going analyses.

With regard to the commitment of resources to use the CEPA system, five of the states declared that they would probably not use it if additional resources (manpower and/or money) were needed to maintain and operate it. Two states felt that the resource issue was not a major problem for them and that they would not be deterred from using it by resource constraints. All of the states indicated that they would at least consider using the system if it did not require an increase in resource requirements. Most indicated that the system would need to demonstrate its utility before the commitment would be made. One indicated specifically that a large and complex system paralleling the 13 volume guideline series[1-13] would probably be ignored.

All of the states felt that if the system were to be implemented it would be used in-house rather than by a contractor. This answers one of the primary concerns of whether the system would promote the development of in-house capability.

There were a wide variety of possible other applications of the CEPA system described by the states. The use of the system in the 5-year update of the maintenance plans was one of the most obvious areas. One state did indicate that it would prefer to have EPA support the system if it

Table 5-9. Potential State Agency Use of a CEPA System

| Issue | State<br>1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Is the CEPA concept useful? | Yes | Not very | Yes | Yes | Yes | Yes | Yes |
| When must it be available? | 1/77 | Too late | 6/77-12/77 | Too late | Too late | 1/77 | 7/77 |
| Would the agency commit additional resources to use a CEPA system? | No | No | No | No | No | Possibly | Possibly |
| Would the agency use the system is no additonal resources were required? | Yes | Possibly | Yes | Yes | Possibly | Possibly | Possibly |
| Would the CEPA system be used in-house or contracted out? | In-house | In-house | In-house | In-house | In-house | In-house | In-house |
| What are other possible uses for a CEPA system in the agency?[a] | 5-yr. update PSD | PSD, track area sources | 5-yr. update, PSD, NSR, SIP revisions, 208 analysis | 5-yr. update, 208 analysis, CZM analysis | PSD, energy scenario evaluation | PSD, NSR | 5-yr. update, PSD, Alternative scenario evaluation |
| General Comments | System to keep track of area source data helpful. | | Good system will get later use. | Would not support if if states had to collect data and submit it to EPA. Must be integrated into current emission inventory process. | A large complex system analagous to the 13 volume guideline would be ignored. | Must be better than existing methods. | Would have to be easy to use. |

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[a] PSD-prevention of significant deterioration, NSR-new source review, CZM-coastal zone management.

were only to be used every 5 years. Another state indicated that the 5-year update would probably not be as complex as the current round of analysis but that the system might still prove useful.

Use of the system in prevention of significant deterioration analyses was mentioned by all but one of the states. Although the details of the PSD analyses have not yet been outlined, it is evident that some of the same analysis techniques as are being used in the maintanance planning process are applicable. This is a clear indication that the CEPA system needs to address other than the AQMA analysis if it is to be useful.

CEPA could also be used in New Source Review programs, for interfacing with other planning programs (e.g., 208, CZM), to evaluate alternative growth and development scenarios, and to track area source data.

### 5.2.6. Other Agency Priorities

Table 5-10 lists the priority issues identified by the states. The most frequently occurring issue was the development of better dispersion models, particularly for complex terrain, short averaging times, and photochemical oxidants. Four states indicated that better growth projections were important. This was more from the standpoint of how to forecast what will happen rather than how to convert these forecasts into emissions. Several states felt that additional federal assistance in the form of money for additonal positions and for contractual help was important.

### 5.2.7 State Agency Summary

In most regards, the perspective of the state agencies on the utility of a CEPA system parallels the Regional Office perspective. The concept is basically a good one but is too late to be of much value in the current analyses. The potential for future use of the system will depend on how well it can adapt to other agency needs such as prevention of significant deterioration regulations, new source review, and others. The agencies are willing to assign resources to the use of a CEPA system as long as it does not increase overall resource requirements; the states would plan on using it in-house. A CEPA system that helps with the maintenance of emission inventory information, particularly area sources, would be most helpful. A system that is excessively large and complicated to use would be ignored.

Table 5-10. State Agency Priorities

| State | Priority Issues |
|---|---|
| 1 | Additional short term dispersion models, highway model between HIWAY and APRAC.<br>Assistance on growth projections and allocations.<br>Better definition of worst case conditions. |
| 2 | Photochemical oxidant models.<br>Federal assistance to do growth projections. |
| 3 | Emission inventory.<br>Additional positions.<br>Particulate transport, reintrainment, fugitive dust. |
| 4 | Additional positions and time for analysis.<br>Guidance on developing politically and socially acceptable control strategies. |
| 5 | Additional training on air quality analysis procedures.<br>Dispersion models for complex terrain. |
| 6 | Development of better growth and allocation procedures.<br>Additional positions.<br>Better dispersion models. |
| 7 | Energy development projections.<br>Dispersion models for short term, rough terrain, oxidants. |

## 5.3. THE CONTRACTOR PERSPECTIVE

Non-agency technical personnel are being widely used in all phases of Air Quality Maintenance Planning. Results of the Regional Office telephone survey indicate that 27 states have initiated work or plan to initiate work with private consultants and 7 states will rely on regional planning agencies for AQMP analysis. With almost 80% of the states using some form of outside assistance it is important to look at CEPA from the contractors perspective.

### 5.3.1. Character of Contractual Assistance

Contractors act as an extension of the air pollution control agency staff. Contractors (or consultants) may be hired using agency operating funds, with special state funding or with special federal funds. Contractual services are easier to aquire than additional budgeted positions and have thus become a preferred mechanism for non-routine agency activities. Contractors in the CEPA review have been divided into three categories: 1) the individual consultant, 2) the private sector consulting organization, and 3) the governmental planning agency.

Almost all of the agencies reviewed have employed individual consultants from time to time. Individual consultants are mostly university personnel who have specialized in modeling, economics or law. Three of the agencies surveyed use local university computers for dispersion modeling. University staff have been hired for programming assistance. While most agencies are using local consultants directly or indirectly in AQMP, individuals are only being used in specialized areas. No individual consultants were observed being used for a major portion of the plan development.

Consulting organizations, on the other hand, have been employed both for specific segments of plan development and for the development of entire plans. Consulting organizations can be subdivided into private sector consulting firms and governmental planning agencies. While the operation and character of these two types of organizations are quite different, the service they perform is essentially the same. Of the 43 states commented on by the Regional Offices, 27 states had plans to employ private sector consulting organizations to develop a significant portion of the plan. Two prime reasons given for contracting AQMP work are:

1) insufficient number of budgeted positions for AQMA plan analysis and development, and

2) lack of knowledgeable personnel in specialized technical areas.

While the most common response for contracting AQMA work has been, "We don't have enough people to do it in-house", one must question internal priority and institutional forces which promote use of outside contractors. It has been observed that states with 100-200 budgeted positions have opted for contractual assistance. One institutional arrangement which facilitates contracting are EPA's BOA agreements. The basic ordering agreement allows states to use EPA funds to obtain technical assistance from outside contractors, thus freeing agency staff for other more routine activities.

The BOA contractor can be funded by a state to conduct an entire AQMA analysis. Tasks involved in the contract include emission inventory update as well as growth projections, emissions allocation, modeling and strategy development. The same company may complete various portions of plans in several states. While it is not uncommon for a private sector consultant to develop the entire plan, indications are that in most cases, the state air pollution control agency provides some guidance during the analysis and often will intervene in contractural work to test specific strategy options. If the contractor is hired using BOA funds, the Regional Office frequently becomes a major influence in determining the scope of the effort. It has been observed that five or six private sector contractors are performing most of the AQMP work. The scope of the contracts and level of detail vary from state to state. Analysis techniques range from crude growth and allocation routines to the most specific level of detail. The general opinion of private sector consultants has not been favorable. While contractors appear to have the technical capability and can meet time deadlines, the quality of the work has been questioned. Contractors, on the other hand, have complained about the lack of cooperation and poor data supplied by agencies for the analysis.

Another instance where work is being conducted outside the APC agency is where regional planning agencies have been given AQMP responsibility.

Councils of Government (COGS), Regional Planning Agencies and City Development Organizations are state chartered organizations charged with a variety of tasks related to growth and urban planning. A planning organization may encompass a single urban area or may include many cities, townships and counties. Population growth, transportation, water and waste treatment, as well as economic and environmental effects of growth are issues addressed by planning agencies. Funding for these agencies come from local governments, state governments and federal grants. A variety of federal agencies including HUD, DOT and EPA provide grants to local planning agencies. Development of these organizations varies greatly from state to state. Some states are well organized with budgets for AQMP work, other states have small agencies with little or no air pollution capability. Seven of the AQMP states have planning organizations with funding and manpower sufficient to perform a major portion of the AQMA plan.

In each of the four governmental planning organizations participating in AQMP development, all four were operating with only minimal guidance from the state air pollution control agency. All four agencies had completed the analysis ahead of schedule and in every case the Agency appeared satisfied with the analysis. In general, local and regional planning agencies appear to be adequately staffed and technically capable of performing AQMP work. They are integrating air planning with 208 water planning and tend to display a better grasp of AQMP than either the private sector contractors or the air pollution control agencies surveyed.

As part of the CEPA study, two governmental planning agencies were surveyed. Both agencies had completed the entire plan and each worked independently of the state air pollution control agency. In each case only minimal technical assistance and data came from the state APC Agency. One of the surveyed planning agencies was regional and the other was a city planning agency. Both received state and federal funding including 208 money. Two other planning agencies were studied as part of another project. Comments and opinions of those agencies have also been used.

### 5.3.2. AQMA Planning Evaluation

Because of the limited number of interviews conducted as part of this study, only two contractor-type organizations provided opinions regarding the development of a CEPA system. Although the contractors visited make-up of a good cross-section of non-agency AQMP staff, it is not certain that their opinions are representative of all outside contractors.

A strong case was made by one of the planning agencies, that AQMP's should not be developed by the state air pollution control agency. Development of such plans represent a conflict of interest according to the planning agency. When state agencies develop plans, they use their own data and perspective to develop plans which will directly impact the funding and the influence over local regulations given to that agency. Evaluation of the adequacy of existing regulations should be made by a knowledgeable "disinterested" independent organization. An example of agency perspective influencing Air Quality Maintenance Plans is the case of an agency explaining why particulate readings are exceeding standards as part of the AQMP instead of revising enforcement policy for the pavement of dirt roads. Other reasons for not developing maintenance plans within state air pollution control agencies include the right of local communities to establish their own plans and the inability of state agencies to properly coordinate with highway, water and other city planners. Thus the point was made that 1) state agencies should not be encouraged to develop their own plans and 2) if EPA wishes to develop CEPA, it should be for regional and local planners, not state air pollution control agencies.

### 5.3.3. CEPA System Timing

All of the contractors interviewed indicated that a CEPA system, even if available today, would only be of limited value. The two planning agencies interviewed have completed their plans and indicated that a CEPA system might be used for future review of the plan. If the CEPA system had been available in the early part of 1976, it would have been extremely useful to the agencies interviewed. The most probable application of a CEPA developed in 1977 was for 1978 plans involving transportation and/or land use controls. Another potential application was in non-attainment states. A CEPA system developed in 1977 could possibly be used to reevaluate plans and cross-check work done in non-attainment areas.

### 5.3.4. CEPA System Design

Both of the two contractors interviewed expressed strong reservations regarding a CEPA system's ability to accept the diverse character of local planning data. One agency for example used gas meter data from a local utility, basing the entire plan on the utility's gridding procedure. The other private sector consultant, who was exposed to AQMP in several states elaborated on the poor quality of state planning analysis. If a CEPA were developed, it would have to be modularized, system assumptions would have to be clearly defined and easily adaptable to local conditions. A series of small computerized routines would best suit the needs of AQMP analysis. One planning organization developed internally over 20 separate computerized routines to aid in the analysis as defined in Volumes 7 and 13. The other contractor interviewed had also developed internal computational routines.

In every case, the routines were written in FORTRAN. Similar to air pollution control agencies, personnel in contracting organizations working on AQMP were primarily engineers with programming backgrounds in FORTRAN and limited working knowledge of COBOL. As a result,all those interviewed preferred a CEPA system written in FORTRAN and easily used by personnel other than computer programmers. The contractors were in agreement in their desire for batch processing. A feeling was expressed that interactive programs were too expensive and bulky. The CEPA routines should be able to accept a variety of input data including:

1) census tract data,
2) utility data,
3) FHWA data formats,
4) local growth estimates,
5) local emission estimates, and
6) Bureau of Mines data.

The CEPA programs should include a variety of transformations to manipulate data for preprocessing and to process output suitable for model use. Most importantly the programs should be well documented and simple to use.

### 5.3.5. Potential Contractor Use

Each of the contractors expressed an opinion that CEPA routines would have been useful if they had been available earlier in the AQMP process. Unfortunately, CEPA timing and AQMP due dates make potential contractor use of CEPA limited. If a CEPA were developed by early 1977, it would probably receive limited use by private sector consultants. The system would be used in states who are now just planning their AQMP effort. Portions of the CEPA system could be used for other projects related to modeling and emission inventories. It is not likely that a CEPA system would be used by private sector contractors to recheck their AQMA analysis. Planning agencies are not likely to reopen their analysis unless they receive specific funding for such a task. Potential contractor use of CEPA routines is limited to plans due in 1978 and not yet contracted and emission/air quality projects which could be simplified using special routines which would be incorporated as part of the CEPA.

### 5.3.6. AQMP Priorities

One of the contractors interviewed was unable to indicate any special priority in the AQMP process. The other, however, had definite feelings regarding the weakest aspect of AQMP. Emissions inventory data is by far the weakest aspect of AQMP. It was necessary for the planning agency to totally reestimate emissions in its AQMA. A private sector consultant was given extremely poor emissions data with which to work in one state and had to survey all point sources to obtain adequate emissions data in another state. Without good emissions data the entire plan is of little value. Simulation runs of various strategies will not be representative of actual controlled emissions and the final strategies will be unrealistic. Virtually every agency has had to reevaluate baseline emissions before AQMP could proceed. Any effort in AQMP by the Federal Government should be placed in improving emission estimates. This feeling is the strongest expressed by planning agencies and private sector consultants regarding AQMP.

### 5.3.7. Contractor Summary

From the perspective of private sector contractors, and governmental planning agencies, any CEPA system at this point in time would be of limited value. CEPA would be too late for AQMP's due in 1977. CEPA components may be of value for 1978 plans and would be of value for future projects. Potential uses of CEPA components would be for data translation for modeling, PSD, checking future emission estimates for new source review and for general agency improvement of existing emission estimates. Contractors would support Federal funds being used to improve emission inventories but would not favor a "big black box" which would only act to compound the problems of state air pollution control agencies.

## 6. CONCLUSIONS AND ALTERNATIVE PLANS OF ACTION

The conclusions to be drawn from the information accumulated in the course of this preliminary feasibility study are not clear cut. There are indications that a CEPA system would have some definite advantages in performing air quality analyses. At the same time, there is little indication that CEPA development is a matter of utmost priority. Given this situation, the decision to proceed with the feasibility study of CEPA must be made on the basis of evaluating several issues that are important to the entire air quality management process. The purpose of this section is to provide the decision-makers with an identification of these issues and an assessment of how CEPA system development is impacted by each. A set of alternative courses of action is also outlined.

### 6.1. IDENTIFICATION OF ISSUES

The key issues that will influence the decision on CEPA system development are the following.

### 6.1.1 Analysis Requirements

The analysis requirements generated by the AQMA regulations specify that emissions be projected for at least the baseline year, one intermediate year, and the tenth year of the planning horizon and that these emissions be allocated to a finer than countywide spatial resolution. The CEPA system will have direct impacts on how these requirements are met.

| Arguments For CEPA Development | Arguments Against CEPA Development |
|---|---|
| 1. Even the minimum output requirements call for the handling of a substantial number of pieces of information. When the possibility of evaluating several control strategies and/or growth scenarios is included, the data handling problems multiply rapidly. | 1. Despite the data handling problems, most states have managed to do the analysis either manually or with in-house-developed computer systems. A number of the analyses are relatively simple involving only a few sources and would not require computer assistance. |
| 2. There is evidence to indicate that the sophistication of air quality analyses has been reduced where no computerized system was available and has been enhanced where the state developed its own system. | 2. Where necessary, it is possible to use contractual assistance to increase the level of sophistication of the analysis. Also, Regional Offices can permit less sophisticated analysis techniques. |

| For CEPA (cont'd) | Against CEPA (cont'd) |
|---|---|
| 3. The CEPA system has potential use in Regional Office review of AQMA plans and in the several situations where the Regional Office may have to promulgate a plan. The CEPA system will also encourage a degree of uniformity in plan submission making review easier. | 3. The Regional Offices can use contractual assistance to develop the necessary plans. |
| 4. The CEPA system will permit the processing of local planning data and will assist in achieving the required interagency cooperation. This has been demonstrated in the experience with state-developed systems. | 4. The diverse nature of local planning data makes it difficult to design a CEPA system that will have nation wide usefulness. |
| 5. The availability of a CEPA system will improve the quality of the analyses by allowing the states to process more information, cross-check the data, conduct sensitivity analyses, and evaluate alternative growth and development scenarios. | 5. The availability of a CEPA system will promote heavier reliance on computer-generated calculations, which can lead to a decrease in agency evaluation of the reality of the calculations. The CAASE program has led to problems in this respect. |
| 6. A CEPA system will assist in the emission inventory process by providing a structure for data collection and by forcing the issue of compatable data base use on the part of air pollution control and other planning agencies. | 6. The CEPA system itself will not alleviate the need for extensive effort to compile emission inventory data. |

### 6.1.2. Timing of System Development

The timing of CEPA system development and introduction is a significant issue in the decision to proceed with further study at this time.

| Arguments for CEPA Development | Arguments Against CEPA Development |
|---|---|
| 1. If parts of a CEPA system were made available in a relatively short period of time they could be very useful. The system could also be useful for the plans that require transportation and land use controls that are not due until 1978. | 1. The CEPA system is too late to be of major value to the AQMA analysis process. Even where it may be useful for later plans, inertia will inhibit the agencies from changing direction to utilize CEPA instead of their current procedures. |

| For CEPA (cont'd) | Against CEPA (cont'd) |
|---|---|
| 2. There is general agreement that the CEPA system will be useful for the 5 year update required of AQMA plans. System development begun now will avoid a timing problem later. | 2. Development of a CEPA system now could cause some states to request delays in their plan submittals pending the availability of CEPA. |

### 6.1.3. Development of In-house Capability

The issue of in-house capability vs. contractual assistance is a prime consideration in the consideration of CEPA system need.

| Arguments For CEPA Development | Arguments Against CEPA Development |
|---|---|
| 1. Many states wish to improve their in-house capability to do air quality analyses. | 1. Some agencies have state-imposed restrictions on obtaining additional positions and resources. Also the Federal government policy of not getting involved in providing services available from commercial sources except under certain circumstances, may be state policy also. |
| 2. Contractor manpower are typically higher than agency costs ($5000 per man-month vs. $3000 per man month). | 2. An experienced contractor can do a job more quickly than an inexperienced agency and can result in lower overall costs. Contractor assistance can be used to shave the peaks from manpower requirements without the agency having to commit itself to long term employees. |
| 3. From the Regional Office perspective, most of the states could handle a CEPA system in-house. All of the states interviewed indicated that they would use it in-house. | 3. Some states would still prefer to use a contractor for the purpose of obtaining additional resources through EPA grants and/or BOA assistance. This procedure frees their own staff for other work. |
| 4. Contractor performance has not always been acceptable. There are instances where an agency was totally unaware of a contractor's assumptions and analysis procedures. | 4. A large and complex CEPA system could promote even heavier reliance on contractors if the states could not handle it easily. |

| For CEPA (cont'd) | Against CEPA (cont'd) |
|---|---|
| | 5. Some questions have been raised as to the desirability of having an air pollution control agency perform extensive growth and development analyses. Concern has been expressed that these functions belong to a planning agency and not in a regulatory agency. |

### 6.1.4. State Capability and Experience

The decision to develop a CEPA system relies, in part, on whether the state agencies have the experience to maintain and operate such a system.

| Arguments For CEPA Development | Arguments Against CEPA Development |
|---|---|
| 1. The AQMA analysis staff of an agency is typically two engineers. A CEPA system would reduce their computational work load and allow them to pursue more analytical tasks. | 1. Agencies do not typically have a computer analyst or programmer directly assigned to AQMA work and who can handle very complex computer system and data base manipulation routines. |
| 2. All of the agencies surveyed have experience with computerized dispersion models. A CEPA system would be of approximately equal complexity. | 2. The agencies using CAASE, which is a computerized allocation routine, are experiencing some difficulties in getting it operational. |
| 3. All of the agencies surveyed have access to large computer facilities and programming staff which can be used to operate a CEPA system. | |
| 4. All of the agencies surveyed felt that they would be capable of handling a CEPA system in-house. | |

### 6.1.5. Agency Use

Perhaps one of the most critical issues in the entire decision on CEPA development is whether the air quality analysis agencies would use it if it were available.

| Arguments For CEPA Development | Arguments Against CEPA Development |
|---|---|
| 1. Eight of the Regional Offices surveyed indicated that they would encourage the use of a CEPA system although not for all states and agencies. | 1. One Regional Office felt the system was unnecessary and another indicated it was neutral toward its utility. |
| 2. All of the states surveyed indicated that they would give consideration to using a CEPA system in their air quality analyses provided that it did not require an increase in resources. | 2. It was generally agreed that a large and complex system would probably not be used. Five states surveyed would not commit additional resources to use a CEPA system. |
| 3. The states indicated that there were definite possibilities that the system could be useful in analyses other than AQMA (e.g., prevention of significant deterioration, new source review). | |

## 6.2. ALTERNATIVE COURSES OF ACTION

There are basically three alternative courses of action that can be followed at this point. These are:

1) Discontinue further study.
2) Proceed with Phase 2 as planned.
3) Modify the scope and objectives of Phase 2.

There are ample justifications for proceeding along each of the three paths.

### 6.2.1. Discontinue Study

It may be reasonably argued that the information gathered in the preliminary study indicates that the development of a CEPA system is too late to be of any use in the AQMA analysis and that the Regional Offices and state agencies are taking a cautious, rather than enthusiastic, view of its utility at this point in time. Other needs, such as better dispersion models for complex terrain and better data for emission inventories, have arisen in the course of this survey and limited resources might better be utilized to solve other higher priority requirements.

It may also be reasonably argued in favor of continuing that previous delays in the consideration of a CEPA system have resulted in the present circumstances. There is evidence to indicate that a CEPA system, properly designed and introduced, would have found extensive use in the AQMA analysis. Delay of further consideration of the system now would only postpone the problem to some future date when it will surface again. The same poor timing that inhibits CEPA system utility now would again inhibit its utility later.

### 6.2.2. Proceed with Phase 2

Phase 2, as planned, will provide insight into the utility of four computerized air quality analysis systems and although these will not be of direct value to the current AQMA analyses, they will provide a reference point as to what kinds of techniques are the most useful. The Phase 2 effort also focuses on the well-defined analysis requirements of air quality maintenance planning and has the advantage of clearly defined objectives. There is also evidence that a CEPA system based on this review would have some use in later AQMA analyses and in the 5 year update. These considerations, along with those against discontinuing further study, argue for continuance of the Phase 2 effort as planned.

There are reasons for not proceeding with Phase 2 as planned that go beyond the arguments for ceasing all further study. The primary objections can be based on the fact that Phase 2 is too narrow in scope to fit the actual requirements as indicated by the survey. It focuses too closely on AQMA analysis requirements when there are clear indications that a CEPA system could be of use to other air quality management programs. Also, Phase 2 considers only four systems as candidates for all or part of a CEPA system. A number of other possible candidates may exist in other Federal and state agencies, which may be of significant value in meeting overall air quality analysis goals.

### 6.2.3. Revise Phase 2

There are some strong reasons for considering a revision of the Phase 2 effort and a change in direction to suit the broader requirements that have surfaced in this preliminary study. It is clear that an identification of the analysis requirements of other air quality management programs and the integration of these requirements into the overall design of a CEPA system is needed to insure maximum utility of the computerized routines. One portion of the Phase 2 effort specifically addresses the specification of CEPA system performance requirements independent of existing routines and this could easily be expanded to include programs other than AQMA analysis.

Phase 2 could also be modified to include a review of more than the four systems currently planned for consideration. As has been done in the past, it may prove useful for EPA to issue a notice in either the Federal Register and/or the Commerce Business Daily indicating an interest in collecting information on available computerized routines that might be applied to emission projection and allocation. A program underway by the EPA Office of Transportation and Land Use Policy will have as one of its outputs a review of growth projection techniques; these should be considered for CEPA system use. The previously referenced Federal information service on computer routines should be reviewed for potential candidate programs. It is possible that this expanded scope of the Phase 2 effort can be met within the constraints of the current resource commitments by decreasing the level of detail in which the present four systems will be reviewed.

An even broader scope of Phase 2 can be considered. This would involve a review of all of the air quality analysis requirements and available tools with a view toward developing a systematic plan for the upgrading of the methodologies. The publication of a guidebook outlining both current computer programs and routines under development would be of substantial help to agencies conducting air quality analyses. This would, of necessity, involve a joint effort among a number of EPA organizational units with differing areas of responsibility.

From an opposition standpoint, it may be argued that there are too many unknowns regarding air quality analysis requirements of new air quality management programs (e.g., prevention of significant deterioration). A review of these would be speculative at this time and Phase 2 effort operating in this fashion would not have as clearly defined bounds as one that focused on AQMA planning only.

### 6.2.4. Summary

It may be said, in summary, that there are valid reasons for pursuing each of the three courses of action discussed above. The decision-maker must make a determination in the light of other policy and program considerations which were beyond the scope of this preliminary feasibility study. Had the results of the surveys been clearcut in one direction or another the choice would have been obvious. In the light of the lack of such definitive results, it is only possible to present the alternatives along with the reasons for pursuing one or the other in the interest of generating an informed decision.

# APPENDIX A

## Sample Questionnaires

Argonne National Laboratory
Energy and Environmental Systems Division

# Computerized Emission Projection and Allocation System Feasibility Study

## Preliminary EPA Regional Office Survey

Region ____________________ States ____________ ____________

____________ ____________

____________ ____________

____________ ____________

AQMA Representative ________________________________

________________________________

## Discussion Agenda

1. Introduction

(a) Purpose of the Survey

Argonne National Laboratory and OAQPS are reviewing the feasibility of computerizing techniques for projecting and allocating emissions as required by 40 CFR 51 subpart D in air quality maintenance areas.

(b) Information Desired From this Call

A general evaluation from the R.O. perspective on the need for a CEPA system. R.O.'s evaluation of the state and local agency need for CEPA system. General ideas and comments on the type of system that would be most useful. Possibilities for further discussion with R. O. and/or state and local agencies.

2. R. O. Perspective

(a) Have the states requested assistance on emission projection and allocation? How will the R. O. assist: general guidance, conduct growth and allocation analyses, run dispersion models, recommend procedures and models, other?

(b) What tasks will be the most difficult? Would computerization aid in these tasks?

(c) Does the R.O. expect to be in the position of doing an AQM analysis or verifying a state's analysis? Would a CEPA system be of help?

(d) Would a standardized CEPA system simplify the plan review process?

(e) Is the R.O. requiring special types of analyses in addition to the FR notice? Has any decision been made with regard to the required level of analysis detail (i.e. Level 1, 2, 3 in Vol. 7, Order 1, 2, 3 in Vol. 13)?

3. State Needs

(a) What directions are the states pursuing with regard to the AQMA analysis (including task schedule):

| State | Emission Projections | Subcounty Allocations | Air Quality Analysis | General Opinion of Capability |
|---|---|---|---|---|

A - Has asked for federal assistance

B - Plans to do analysis in-house

C - Has initiated in-house analysis

D - Has completed in-house analysis

E - Plans to contract activity

F - Has initiated contract

G - Has completed contract

H - Agency has sufficient depth to conduct analysis

I - Agency will require assistance - and/or positions

(b) What states could benefit from a CEPA system if it is available March 1977, September 1977, December 1977. What states would have no use for such a system?

(c) Have any states developed all or part of such a system?

4. General Comments

(a) General Comments on the need for a CEPA system.

(b) Comments on the type of system that would be most useful.

(c) Would you encourage the use of a CEPA system?

5. Further Discussion
   (a) Is a more detailed discussion and visit worthwhile?

   (b) Agencies that would be good to talk to. Can a meeting be arranged?

Argonne National Laboratory
Energy and Environmental Systems Division
Argonne, Illinois 60439

# COMPUTERIZED EMISSION PROJECTION AND ALLOCATION SYSTEM FEASIBILITY STUDY

conducted for

Control Programs Development Division
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Agency____________________________

Representative_____________________

Position__________________________

## 1. Introduction

EPA is considering the development of computerized aids to perform the emission projection and allocation calculations necessary for AQMA Analysis. Argonne National Laboratory is assisting by conducting a feasibility study of the computerized approach and its potential benefits, if any, to state and local air pollution control and planning agencies. Your response to our feasibility survey would be appreciated to help determine if development of computerized aids should be undertaken. Please answer the questions to the best of your knowledge. It is recognized that in most cases your response will be a "best guess" since many states have not formalized their AQMA approach.

## 2. Extent of Attainment/Maintenance Problem

These questions are designed to determine when various tasks associated with the analysis will be performed and how they will be done.

| | | Projections | | Allocations | | Modeling | | |
|---|---|---|---|---|---|---|---|---|
| AQMA | Poll | Sched | Proced | Sched | Proced | Sched | Proced | Special Problems |

Sched: Time schedule for initiating and completing task, e.g., 8/76 - 4/77

Proced: Procedure by which the task will be carried out, e.g., manual, CAASE, etc.

I - will do task in-house

C - will have contractor do task

F - asked for federal assistance

3. Resources

These questions are designed to identify computer resources available.

(a) What type of computer capability is available?

In-house ________ Machine ________

Time-sharing ________ Core Size ________

Contractor ________

Is this shared with other agencies?

Batch Processing ___

Interactive ___

(b) What types of computer languages are used regularly?

FORTRAN ____ APL ____ SPEAKEASY ____

PL1 ____ COBOL ____ BASIC ____

ALGOL ____ Assembly Lang. ____ Other ____

(c) How many computer personnel are on your staff? Available to your staff?

Operators ______ Programmers ______

Computer Systems Analysts ______ Modeling Staff ______

Other Knowledgable Staff ______

(d) What resources have been allocated to the AQMA analysis? Last year, this year.

Manpower ________________ Money ____________________

Computer Time ______________

(e) Do you feel your computer staff is adequate to operate a large computerized system and/or dispersion model? __________

(f) What are typical AQDM/CDM run parameters?

Cost ____ Turnaround ____ Sources ____ Receptors ____

4. Experience

The following questions are designed to determine previous experience.

(a) What type of dispersion models do you have experience with? What applications?

| | Previously | AQMP |
|---|---|---|
| Rollback | | |
| IPP | | |
| AQDM/CDM | | |
| HIWAY | | |
| PTMAX | | |
| Box Model | | |
| Other | | |

(b) Have any computerized emission projection and allocation analysis routines been used (been planned for use) in the current AQMP process?

CAASE ______ REPS ______ Other ________________
AQUIP ______ FAQM ______

What is your evaluation of the systems you have used?

(c) Has (will) the emission projection and allocation analysis been done manually? What areas presented (may present) the most difficulty?

(d) Is the emission inventory in NEDS-compatable format? Do you plan to use NEDS and SAROAD as prime data sources? If not, what are the alternatives?

5. CEPA System Design

(a) Based on your experience, do you feel there is a need for the computerization of all or part of the emission projections and allocations? What parts, if any? What levels of detail?

(b) Should the system be an integrated package or a set of modular units?

(c) Should the system be designed for principle use on a centralized computer or should it be designed for widespread distribution?

(d) What language should be used?

(e) Should the system be interactive, batch, or a combination?

(f) What data sets would the system have to interface with in your state? What form are they in?

(g) What special features would you like to see the system have (e.g., strategy package , emission factors from AP-42, cross checking, etc.)?

6. Agency Use

(a) If a CEPA system were available would your agency commit the resources to operate it? require your contractor to use it? At what level would you commit resources to it? Contract it out?

(b) Would your agency use it if it were available in January 1977, March 1977, June 1977, September 1977, January 1978? Would you anticipate using it in the 5-year update?

(c) Could you envision any utility of the system for non-AQMA related work?

## 7. Priorities

Please order activities you feel would best aid your agency in long term air quality analysis (place number next to task, i.e., 1 = most needed).

___ Development of a standardized growth model to estimate projected emissions.

___ Development of an allocation model using projected estimates,

___ Additional aids for air quality analysis (e.g., dispersion models)

___ Additional training seminars on air quality analysis.

___ Additional positions for air quality analysis.

___ Federal assistance in doing state growth, allocation and air quality analysis.

___ Special problems (specify).

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